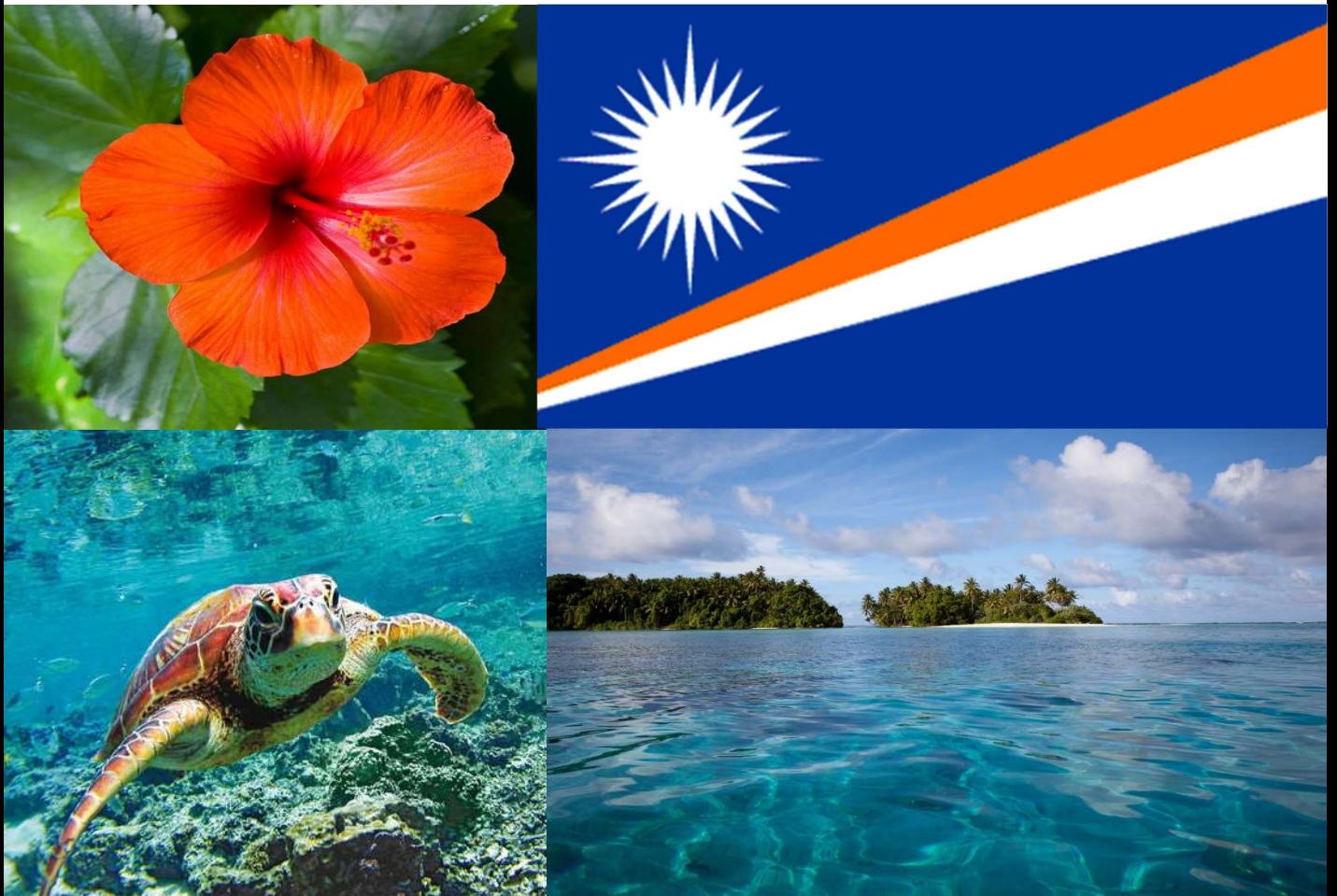


Republic of the Marshall Islands Hybrid Survey FINAL REPORT



2018

Report prepared by: Sarah Ritz and Dr. Haley Cash

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FORWARD

Summary

The aim of this report is to assess the current prevalence of non-communicable diseases (NCDs) and selected risk factors in The Republic of Marshall Islands (RMI). We hope this report enables RMI to better understand its burden of disease, monitor trends, and determine who is at greatest risk for poor health in order to improve health through the development of targeted evidence-based interventions.



Non-Communicable Diseases (NCDs) such as heart disease, cancer, and diabetes are global issues that result in high burdens of disability and premature death. NCDs, substance use, and poor mental health are highly linked to several key risk factors, such as cigarette smoking, tobacco chewing, excessive alcohol consumption, unhealthy diet, lack of physical activity, and overweight/obesity. Diabetes is a major concern in RMI, although the outdated data previously available may not support that. The hospital is overburdened with diabetes patients, often presenting at late stages and requiring amputation and dialysis (not available in-country). The outer islands present a challenge for healthcare delivery and data collection, especially for NCDs. A lot of resources are used for late-stage diabetes treatment. Nutrition is a real challenge due to limited land and very little food produced locally. There is a significant reliance on imported foods that are often processed, nutrient poor, and calorie dense. Although NCDs are a priority in RMI, other health issues should not be overlooked, to include maternal-child health issues, child malnutrition, sexually transmitted infections, mental health, and infectious disease.

The Republic of Marshall Islands undertook a novel population-based household survey that combined NCD and associated risk factor indicators and substance use from July 2017 – April 2018. A total of 2,869 individuals aged 18 years or older participated in the survey. Respondents answered questions about their alcohol and tobacco use, other substance use, dietary habits, physical activity, health access, oral health, health conditions, and cancer screening. Additionally, height and weight, fasting blood glucose, total cholesterol, and blood pressure were measured.

RMI vs. USA

Here are RMI's 2018 Hybrid Survey prevalence data compared to U.S. prevalence data using the most comparable sources available.

	RMI %	US %	Comparison
Current tobacco use (past 30 days)			
Cigarette smoking	22.5	17.0	↑
Smokeless tobacco use*	21.6	4.0	↑
Current alcohol use (past 30 days)			
Alcohol use (any)	16.3	54.0	↓
Binge drinking (5+ drinks per day)	14.8	16.9	↓
Nutrition			
<5 servings of fruits and vegetables (per day)	94.5	76.5 ¹	↑
Health and healthcare			
Fair or poor health (self-reported)	31.6	16.7	↑
<u>No</u> medical checkup in the past year	51.5	29.2	↑
Oral health			
<u>No</u> dental visit within past year	61.5	33.7	↑
Extracted permanent teeth due to decay/disease	79.9	43.4	↑
Chronic conditions			
Overweight/obesity	72.5	65.4	↑
Diabetes (self-reported + undiagnosed)	26.8	12.2 ²	↑
Hypertension (self-reported + undiagnosed)	21.0	33.5 ³	↓
Measured high cholesterol (≥240mg/dL)	4.9	12.1 ⁴	↓
Cancer screening			
<u>No</u> Pap smear in the past 3 years (women 21-65 yo)	66.4	17.5	↑
<u>No</u> mammogram in the past 2 years (women 50-74yo)	78.0	21.9	↑
<p>*Smokeless tobacco use in RMI is defined as use of smokeless tobacco and/or chewing betel nut with tobacco.</p> <p>Source for US comparison: BRFSS 2016 unless noted with ¹BRFSS 2009 or ²Estimation of U.S. (diagnosed + undiagnosed) 18+ prevalence based on NHANES 2011-2014 or ³NHANES 2013-2014 (adults 20+).</p> <p>⁴NHANES 2011-2014 (adults 20+). Note that the US BRFSS overweight/obesity measures are based on self-report.</p>			

Surveillance in RMI:

The table below compares the 2002 RMI STEPS prevalence data to the 2018 RMI Hybrid prevalence data using the most comparable data available.

	2002%	2018%	Comparison
Current tobacco use			
Cigarette smoking	23.1	22.5	○ ↑
Chewing betel nut (with or without tobacco)	1.8	13.8	↑
Current alcohol use			
Binge drinking (5+ drinks per day)	12.7	14.8	↑
Chronic conditions			
Overweight/obesity	62.5	72.5	↑
Diabetes (self-reported on meds or ≥ 126 mg/dL)	19.6	26.8	↑
Hypertension (self-reported on meds or $\geq 140/90$)	10.5	21.0	↑
Measured elevated cholesterol (≥ 200 mg/dL)	21.6	14.0	↓

*Note that the 2002 RMI STEPS data include ages 15-64, whereas the 2018 RMI Hybrid data include ages 18+, therefore these prevalence data are not directly comparable, but still allow us to estimate trends

Introduction

Non-communicable diseases (NCDs) are the leading causes of morbidity and mortality for adults in the United States Affiliated Pacific Islands (USAPIs) (American Samoa, Guam, Commonwealth of the Northern Mariana Islands [CNMI], Federated States of Micronesia [FSM], Republic of Palau, and Republic of Marshall Islands [RMI]) [1].



On May 25, 2010 the Pacific Island Health Officers Association (PIHOA) declared a Regional State of Health Emergency due to the epidemic of non-communicable diseases in the USAPI due to the fact that NCDs account for around 70-75% of all deaths in the region [2]. The NCDs of concern in the USAPIs include diabetes, heart disease, stroke, cancer, and chronic obstructive pulmonary disease [2,3]. Risk factors for developing NCDs within these island jurisdictions are among the highest in the world. This includes tobacco use, poor diet, sedentary lifestyles, and binge drinking [2]. In most of the USAPI, betel nut (which is carcinogenic to human) chewing with or without tobacco is also identified as a significant health problem [4].

Diabetes is a major concern in the RMI. The diabetes epidemic has been linked to lifestyle changes such as, increased dietary fat intake, reduced fiber intake, and reduced physical activity. Other factors such as socioeconomic status, degree of urbanization, and access to health care have also been shown to affect the prevalence of diabetes on these islands [5]. Hospitals are overburdened with diabetes patients, who often present at late stages, oftentimes requiring amputation and dialysis.

Key components of PIHOA's response to the NCD crisis include strengthening NCD surveillance systems and building epidemiologic capacity to improve data quality and reporting in the USAPIs. The last NCD adult population-based survey in RMI was conducted in 2002. Due to the need for current NCD and risk factor prevalence data, the Marshall Islands Epidemiology Prevention Initiative (MIEPI), a local NGO, and the RMI Ministry of Health combined efforts to develop and implement an adult population-based Hybrid survey. Other support was provided by PIHOA, the Centers for Disease Control and Prevention (CDC), the World Health Organization (WHO), the Association of State and Territorial Health Officials (ASTHO), and the Pacific Community SPC. The Hybrid survey was developed to assess NCD risk factors and NCD conditions through self-diagnosis, as well as physical and biochemical measurements.

The Republic of the Marshall Islands (RMI) is comprised of 24 coral atolls, with a total of 1,156 individual islands and islets located in the North Pacific Ocean. The major district centers are Majuro, Ebeye, Wotje and Jaluit. The islands are made up of coral caps set on the rims of submerged volcanoes. RMI has a total land area of 70 square miles that are scattered over the country's Exclusive Economic Zone of over 750,000 square miles [6].



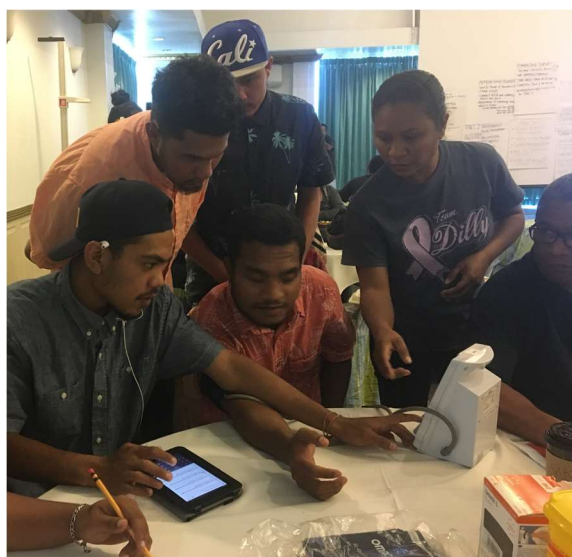
Image source: <http://www.spc.int/our-members/marshall-islands/>

The Republic of Marshall Islands has been a sovereign nation since 1986 with a Compact of Free Association with the U.S. Majuro is the capitol and largest city of RMI. Majuro and Kwajalein are accessible by international airlines. Flights between these islands and 26 other outer islands are also available through Air Marshall Islands airlines. [6]. The population of RMI is 52,158 (2011 Census). A majority of the population (74%) resides on Majuro and Kwajalein atolls. The population density on these two atolls is quite high. Majuro has a total land mass of 3.75 square miles with a population of 27,797 (7,413 people/m²). Kwajalein is comprised of 97 islands and islets and has a land area of 6.33 square miles [7]. Ebeye, an island on Kwajalein atoll is the most populous with 9,614 people on 0.12 square miles (80,117 people/m²). Although the fertility rate is quite high, the population is decreasing due to out migration.

Accessibility to healthcare for the residents of RMI is mixed. While private clinics are available, the majority of RMI residents use the public healthcare system. There are two hospitals, one in Majuro and one in Ebeye. There are 56 outer island health centers managed by the hospital in Majuro by the Office of Outer Islands. Information from these offices are communicated to the Majuro Hospital via radio. Lastly, there are 5 outer island health centers that are managed by the 177 healthcare program for victims of nuclear fallout. The 177 healthcare program is a U.S. federal grant that supports U.S. doctors to manage these health centers.

Survey Methodology

The RMI Hybrid Survey aimed to assess the prevalence of selected NCDs, risk factors, and substance use, which includes questions from validated instruments such as the BRFSS, STEPS, and National Health and Nutritional Examination Survey (NHANES), as well as locally developed questions as needed.



Objectives

1. Inform the community on NCD and risk factor prevalence
2. Use these data to prioritize and tailor NCD prevention programs
3. Support further research on NCD risk and protective factors in RMI
4. Use these data to monitor progress in the fights against NCDs in RMI



Target group

Participants eligible for the RMI Hybrid survey will include all RMI residents aged 18 years and over who were able to comprehend either English or Marshallese and provide consent.

Data collection

Data collection began on July 7, 2017 and ended on April 5, 2018. A total of 2869 respondents completed the survey and measurements. All interviews and measurements were performed by trained enumerators recruited by the Marshall Islands Epidemiology Prevention Initiative (MIEPI)



Sample size



The original sample included 3107 adults. Sample size was determined based on overall adult populations on selected islands in the Republic of the Marshall Islands. (Majuro = 1659; Ebeye = 627; Kili = 200; Wotje = 207; Jaluit = 207; Arno = 207). The final response rate was 92.3%.

Sampling procedures



Stage 1: Households were identified at random according to geographical stratification in Majuro and Ebeye. The country was stratified into two major groups, Urban (Majuro and Ebeye) and Rural (all outer islands). In Majuro and Ebeye, household cluster sampling was used to randomly select households in these areas. Stage 2: In Majuro and Ebeye, one individual was selected at random from each household using the KISH table method. All adults in Kili, Arno, Wotje, and Jabwor, Jaluit atolls were included in the sample because the adult populations are about 200 each on these atolls.

Data collection



Surveys were translated and available in Marshallese and English. Data were collected by trained surveyors using face-to-face questionnaires and anthropometric and other physical and biochemical measurements conducted at central locations the following morning for fasting measurements. Quality control of completed questionnaires was ensured at different stages during the questionnaire-processing phase.

Data entry



All data were collected electronically using a tablet. Tablets were uploaded on a weekly basis at the MIEPI Office.

A data dictionary was created to explain the indicators and data codes.

Data cleaning



Descriptive statistics were produced for all variables. Values that did not match the data codes defined in the data dictionary were verified against the original questionnaire and rectified. Outliers were also checked, validated, and rectified.

Data analysis



Descriptive data analysis was conducted. Chi-squared analysis was used to analyzed differences by:

- **age group** (18-24 years old, 25-34 yo, 35-44 yo, 45-55 yo, 55-64 yo, 65+ yo)
- **gender** (male, female)
- **location** (Majuro, Kwajalein, and other Outer Atolls)
- **education** (high school education or less, more than high school education)

[Due to the representativeness of these data, large sample size, and ability to analyze locally, these data were not weighted.]

Sample Summary

The sample randomly selected to participate in the Republic of the Marshall Islands (RMI) Hybrid Survey appears to be representative of the total population in RMI. The demographic distributions of the 2011 census are relatively similar to the distributions of the survey sample demographics.

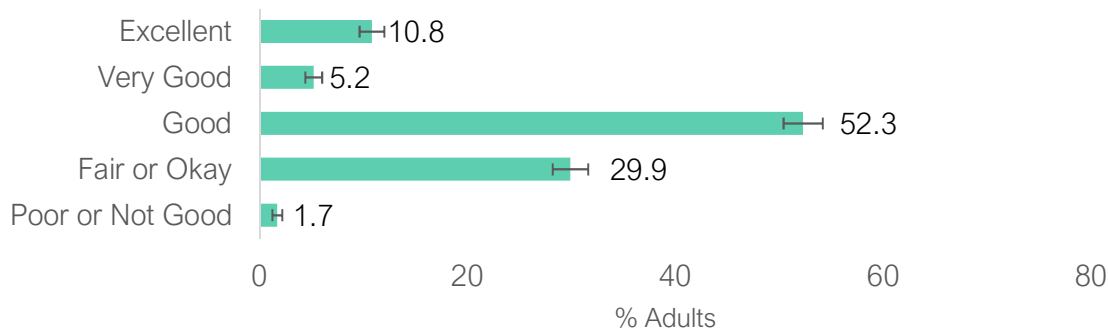
	<u>Survey sample</u>	<u>2011 Census data</u> <u>(ages 18+)</u>
	n=2869	n=28,884
Gender		
Male	1359 (47%)	(51%)*
Female	1510 (53%)	(49%)
Age group		
18-24 years	458 (16%)	6804 (24%)
25-34 years	761 (27%)	8193 (28%)
35-44 years	697 (24%)	5921 (20%)
45-54 years	498 (17%)	4274 (15%)
55-64 years	305 (11%)	2628 (9%)
65+ years	150 (5%)	1064 (4%)
Atoll		
Majuro	549 (47%)	(52%)*
Kwajalein	1360 (19%)	(22%)
Outer Atolls	960 (34%)	(26%)

* Census data reported for all ages

General Health

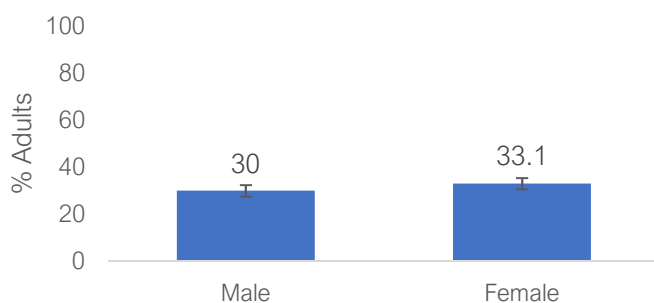
About one-third of adults in RMI (31.6%) self-reported their general health to be fair or poor.

Self-reported health status among adults in RMI, 2018

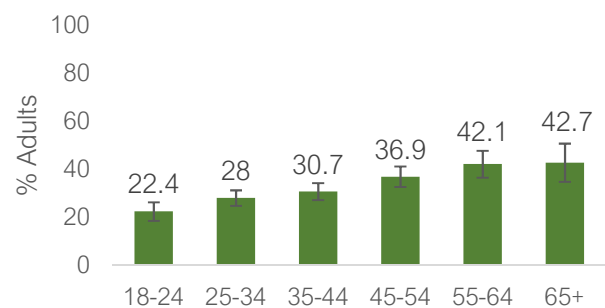


When we examine self-report of fair or poor health by demographics, we find females self-report worse health than men, people with more education self-report worse health than people with less education, self-report of worse health increases with age, and adults in in the Outer Atolls report the highest prevalence of fair or poor health.

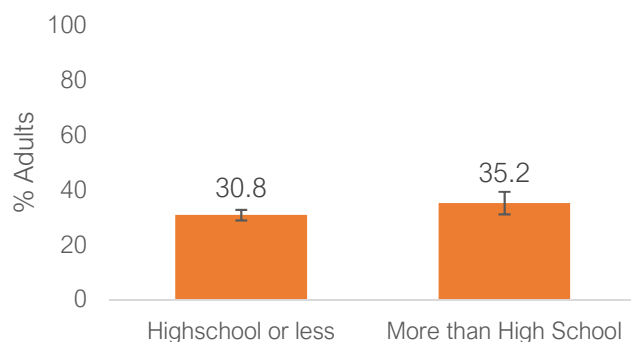
Fair or poor health, by gender



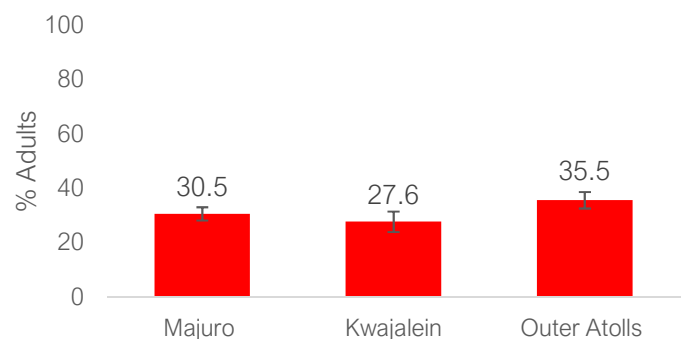
Fair or poor health, by age



Fair or poor health, by education

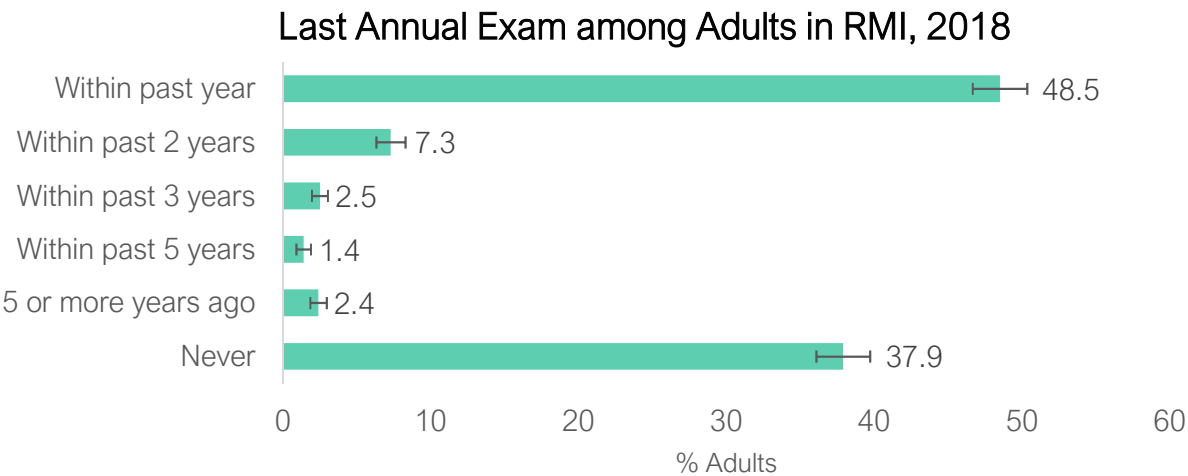


Fair or poor health, by atoll

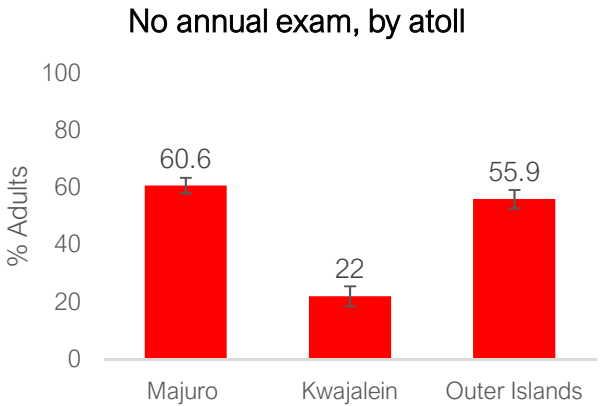
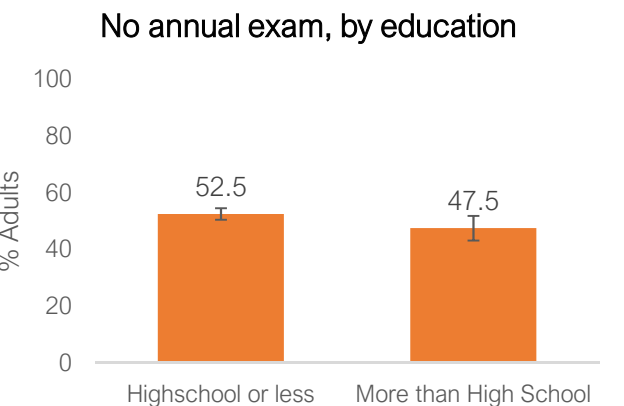
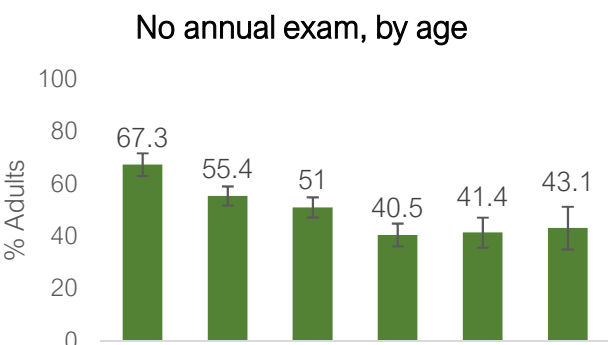
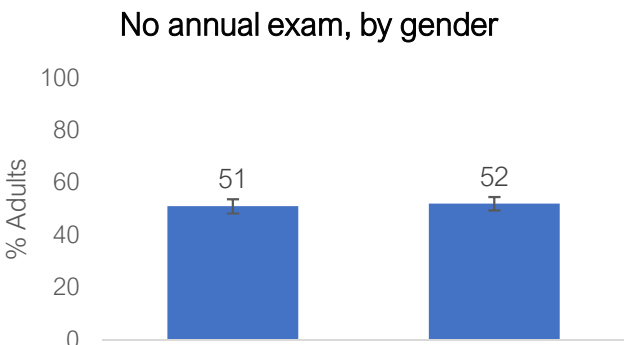


Access to Care

Overall, over half (51.5%) of adults in RMI did not receive an annual checkup in the past year, and two out of five (37.9%) adults have never had an annual checkup.

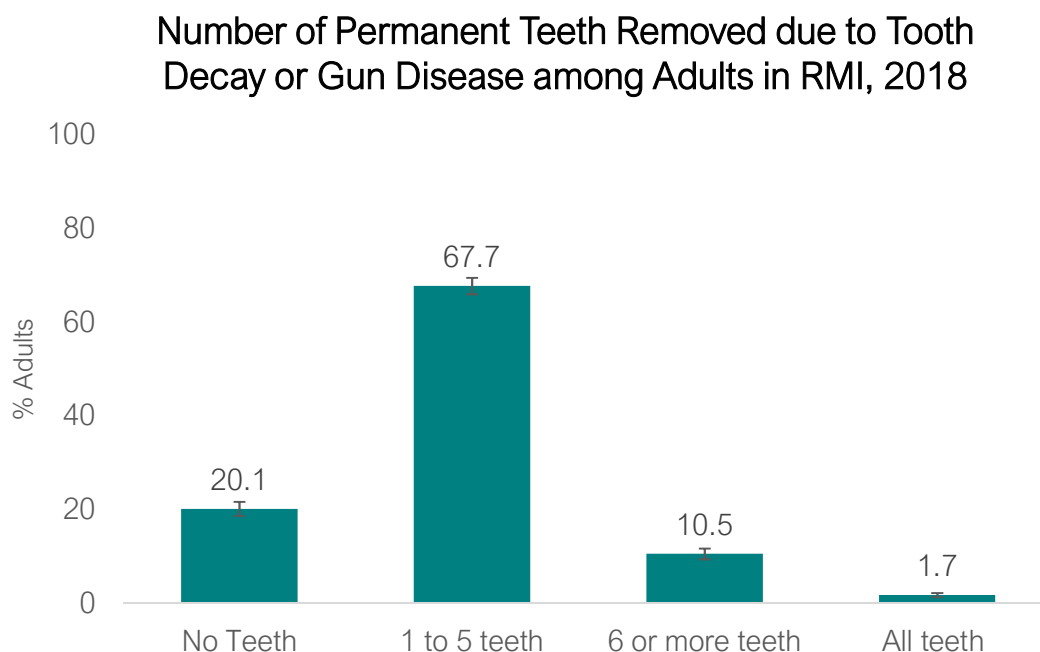
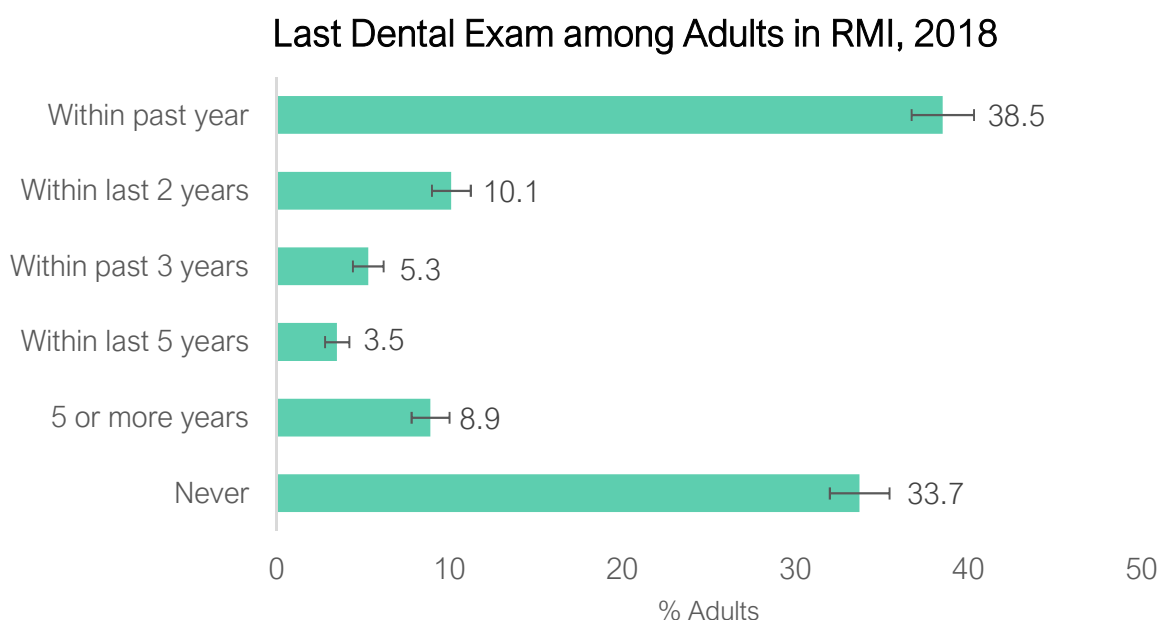


Younger adults, less educated adults, and adults living in Majuro and the Outer Atolls were less likely to have had their annual exams.



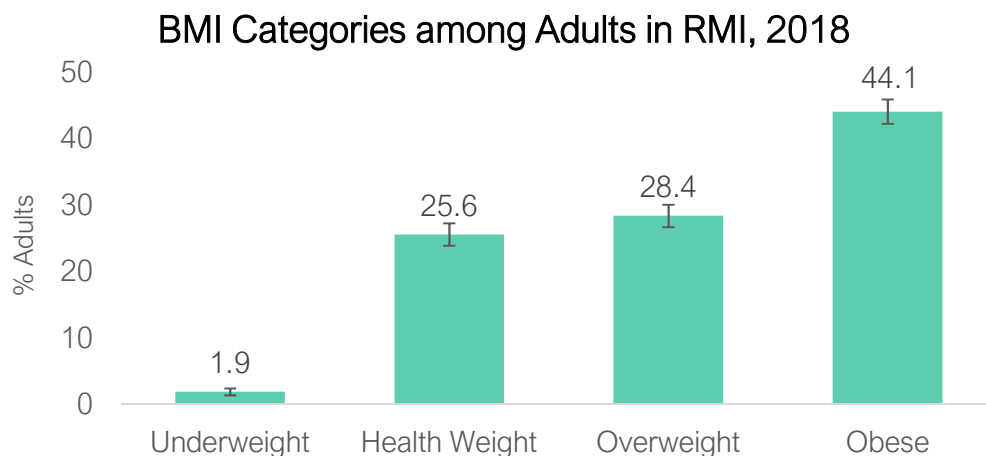
Oral Health

Two out of every five adults in RMI (38.5%) had a dental visit in the past year. One out of three adults (33.7%) in RMI have never seen a dentist. About four out of every five (79.9%) adults in RMI have had at least one tooth removed due to tooth decay or gum disease.

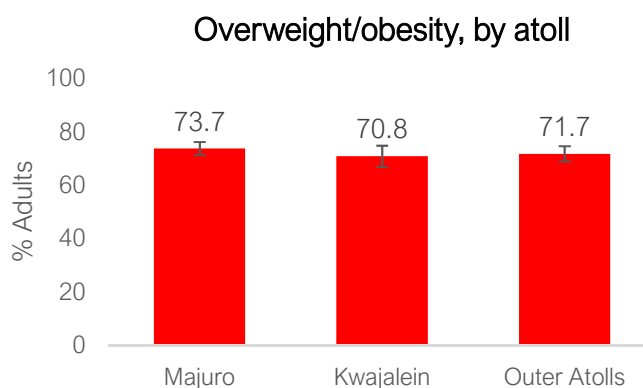
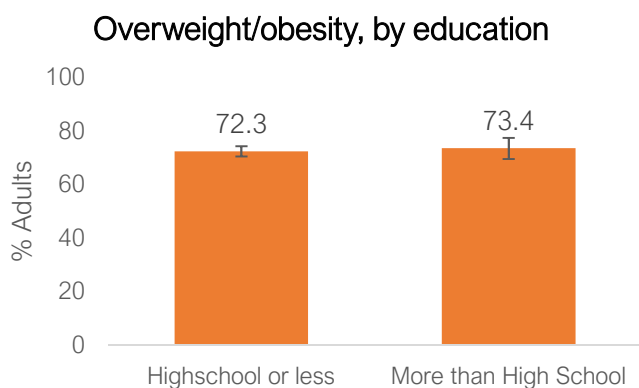
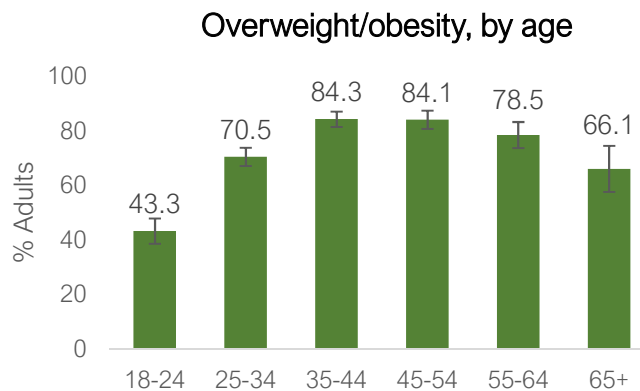
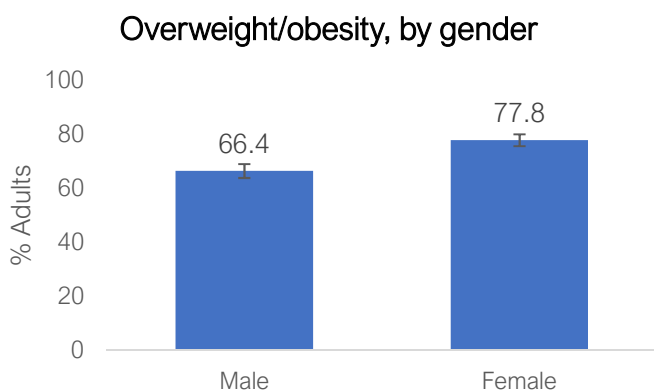


Overweight/Obesity

Body Mass Index (BMI) is calculated based on height and weight measurements. Based on these measurements, almost three out of every four (72.5%) adults in RMI are overweight or obese.



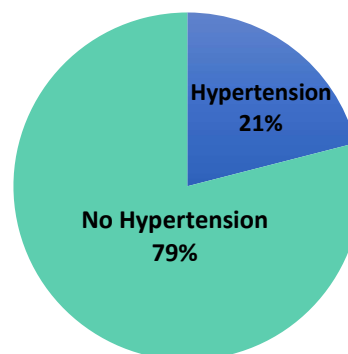
Women and middle age groups have the highest prevalence of overweight/obesity.



Hypertension

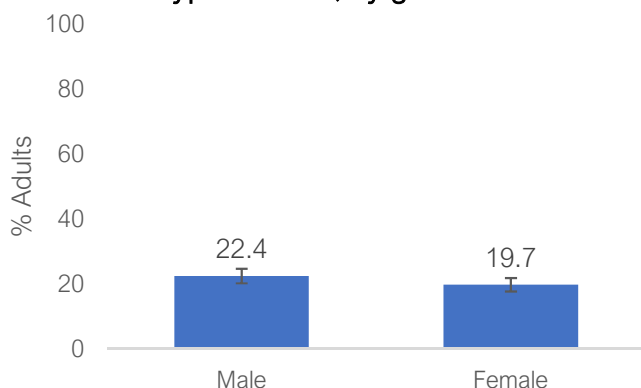
One out of every five adults (21%) in RMI had high blood pressure ($\geq 140/90$) during screening or self-reported having hypertension for which they took medication.

Adult Hypertension in RMI, 2018

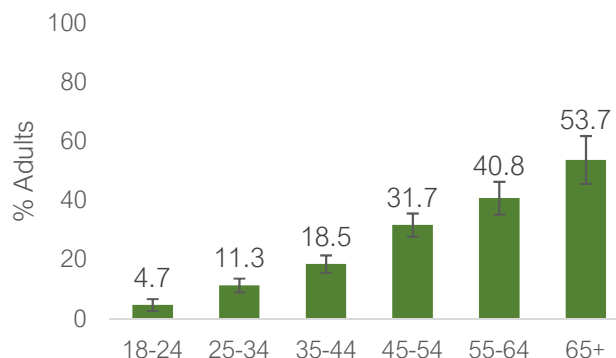


Hypertension prevalence increases with age, with about half (53.7%) of adults 65 and older having hypertension. Hypertension prevalence was slightly higher in men. Additionally, hypertension prevalence was higher for less educated adults, and lowest in Majuro.

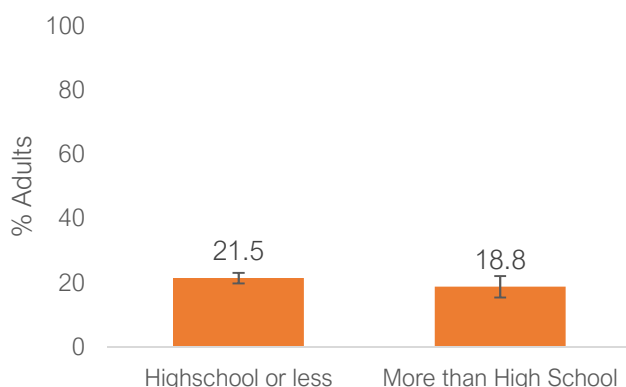
Hypertension, by gender



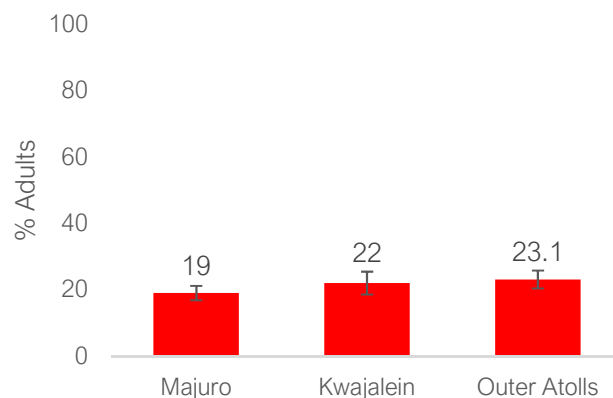
Hypertension, by age



Hypertension, by education



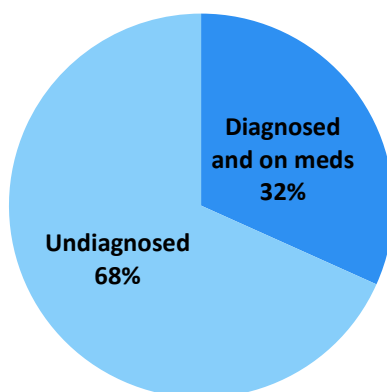
Hypertension, by atoll



Hypertension Diagnosis & Control

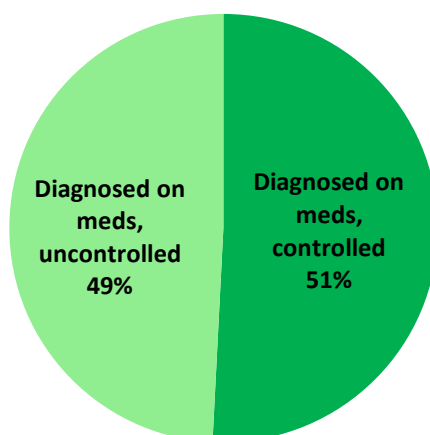
21% of the adult population in RMI has hypertension. Among those adults in RMI classified as having hypertension, over two-thirds (68.3%) are undiagnosed.

Diagnosis Status among Adults with Hypertension in RMI, 2018



Among those adults who are diagnosed and taking medication, about half (49.2%) remain uncontrolled.

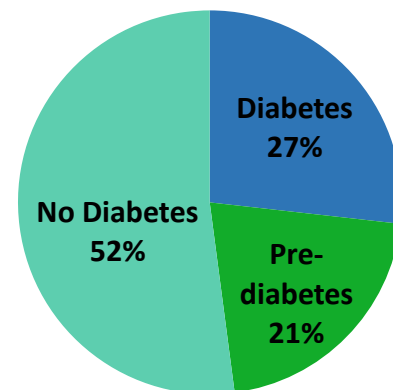
Control Status among Adults Diagnosed with Hypertension and on Medication in RMI, 2018



Diabetes

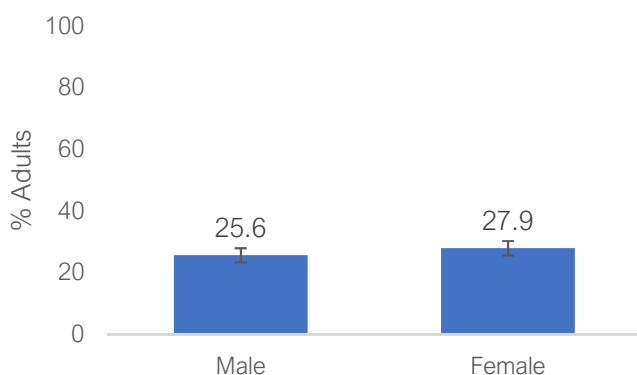
26.8% of adults had measured high fasting blood sugar ($\geq 126\text{mg/dL}$) or self-reported having diabetes for which they were taking medication.

Adult Diabetes in RMI, 2018

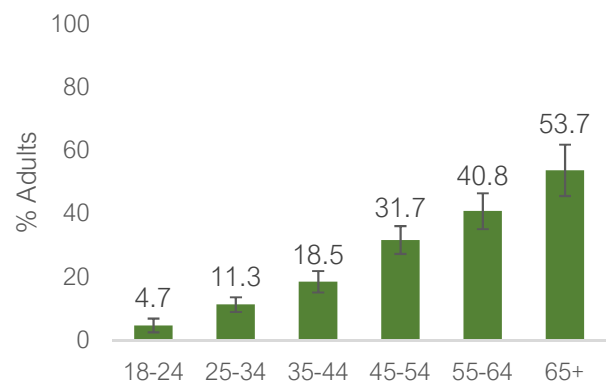


Diabetes prevalence increases with age, with a prevalence of 53.7% among those 65 and older. In addition, there is a higher prevalence of diabetes among women, less educated adults, and adults living in Majuro.

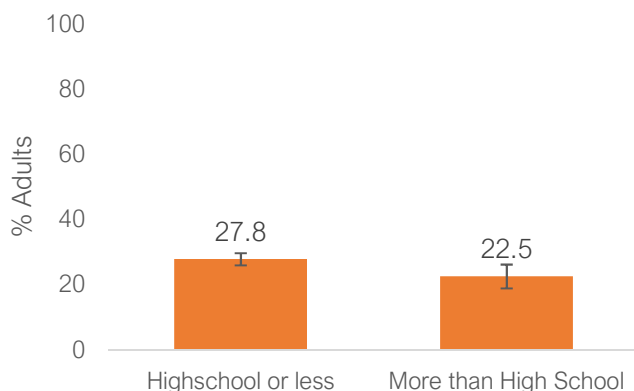
Diabetes, by gender



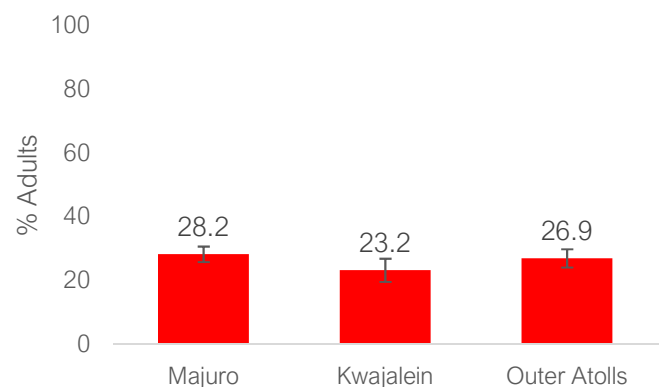
Diabetes, by age



Diabetes, by education



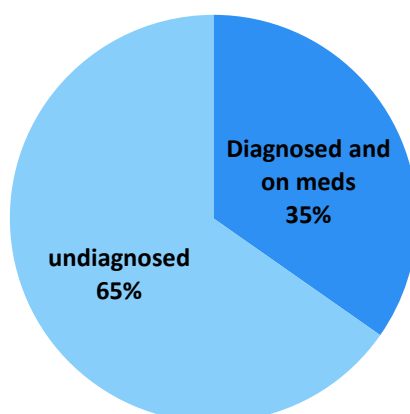
Diabetes, by atoll



Diabetes Diagnosis & Control

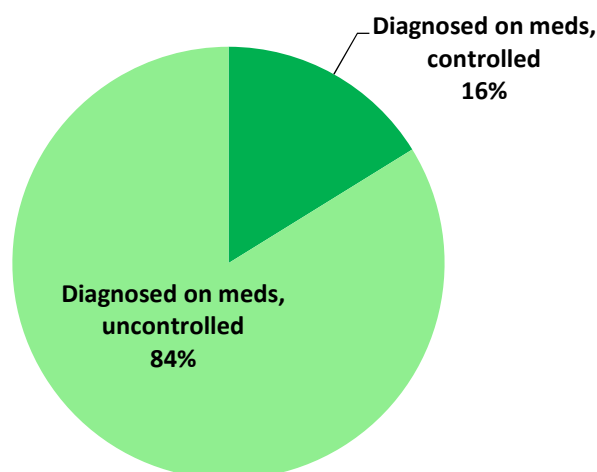
26.8% of the adult population in RMI is estimated to have diabetes. Among those adults classified as having diabetes, about two-thirds (65.3%) are undiagnosed.

Diagnosis Status among Adults with Diabetes in RMI, 2018



Among those adults in RMI who are diagnosed and taking medication, the majority of them (83.7%) remain uncontrolled.

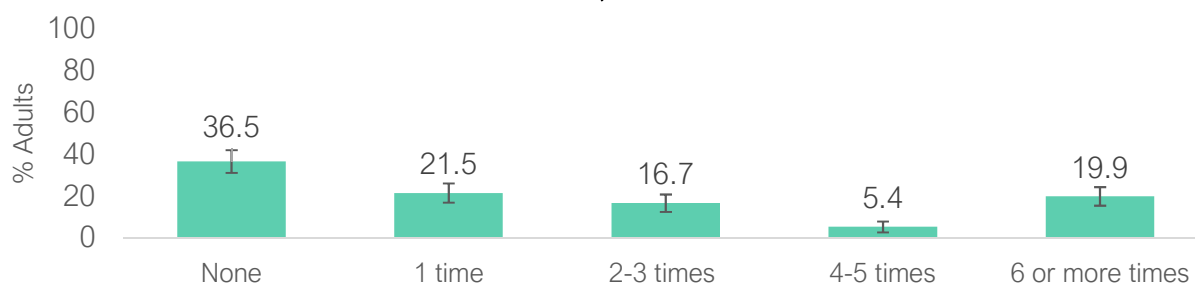
Control Status among Adults Diagnosed with Diabetes and on Medication in RMI, 2018



Diabetes Management

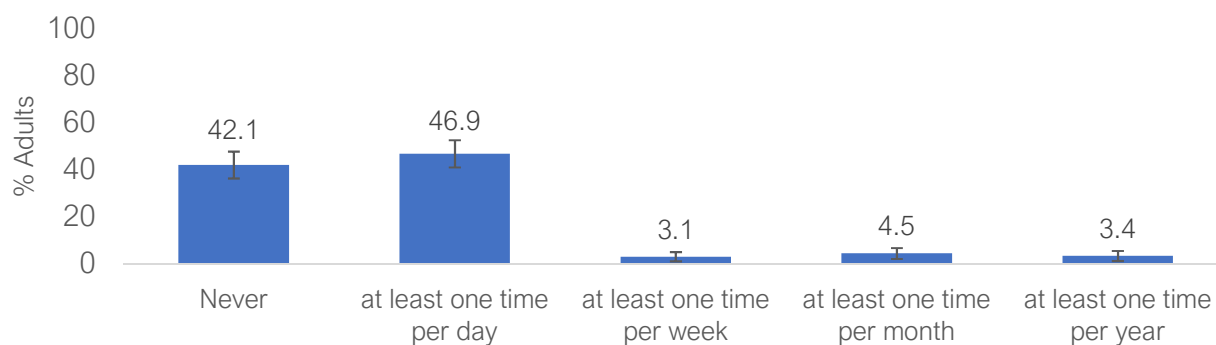
Among adults with who self-reported having diabetes in RMI, about one in three adults (36.5%) have never seen a health professional for their diabetes.

Doctors Appointment for Diabetes in the past year, among Adults in RMI, 2018

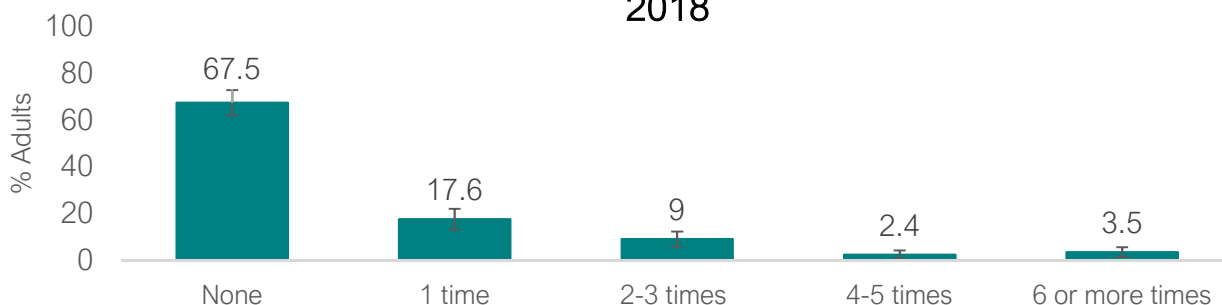


About two out of every five (42.1%) adults with self-reported diabetes in RMI never check their blood sugar levels. 67.5% of adults in RMI with self-reported diabetes have not had their blood sugar checked by a health professional in the past year.

Blood Sugar Self-Check, among Adults in RMI, 2018



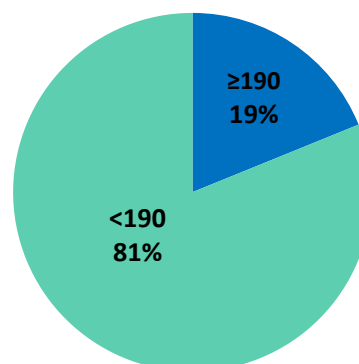
Yearly Blood Sugar Check by Professional, among Adults in RMI, 2018



Total Cholesterol

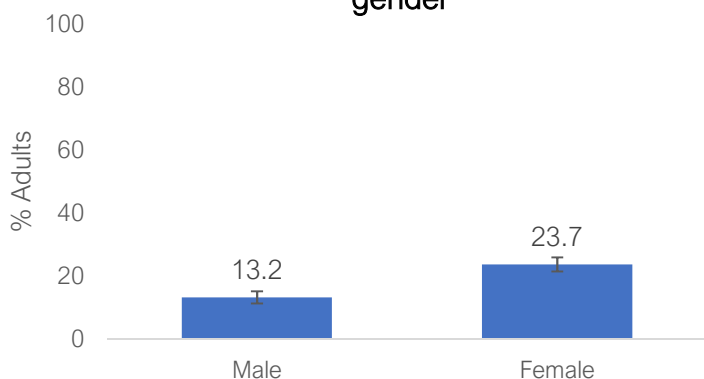
Almost one out of every five adults (18.8%) in RMI had “elevated” total cholesterol (≥ 190 mg/dL) during screening. However, only 4.9% had “high” total cholesterol (≥ 240 mg/dL).

Adult Total Cholesterol in RMI, 2018

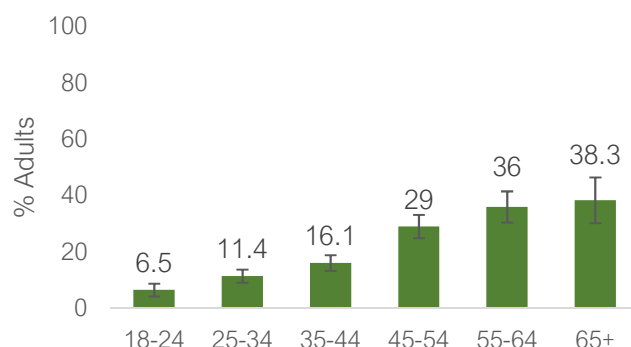


Elevated total cholesterol prevalence was highest among women, older adults, and residents of the Outer Atolls.

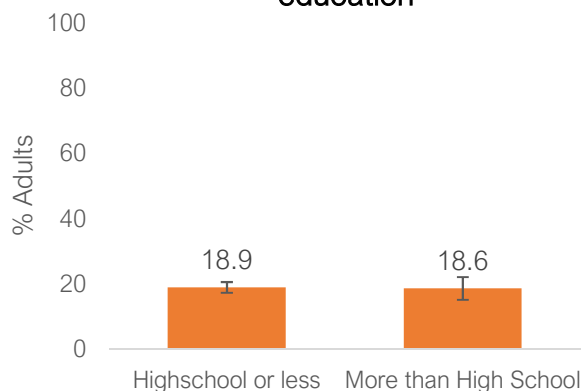
Elevated Cholesterol (≥ 190 mg/dL), by gender



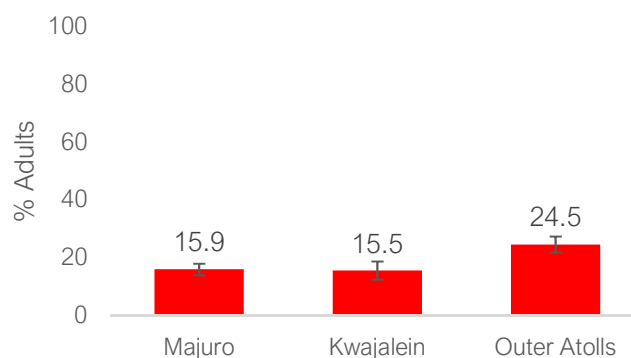
Elevated Cholesterol (≥ 190 mg/dL), by age



Elevated Cholesterol (≥ 190 mg/dL), by education



Elevated Cholesterol (≥ 190 mg/dL), by atoll



Self-Reported Chronic Disease

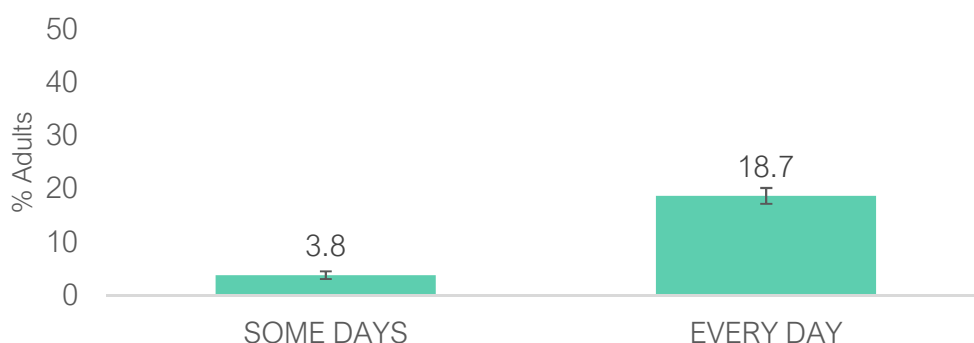
Self-reported chronic disease is organized below by most prevalent to least.

	%	95% Confidence Interval	
Ulcer	6.8	5.9	7.7
Gout	5.9	5.0	6.8
Arthritis	4.4	3.6	5.1
Chronic Kidney Disease	4.2	3.4	4.9
Asthma	3.5	2.8	4.2
Other Heart Condition	2.7	2.1	3.3
Heart Disease	2.1	1.6	2.7
Hepatitis B	1.1	0.7	1.5
Tuberculosis	1.1	0.7	1.4
Emphysema	0.6	0.3	0.9
Stroke	0.6	0.3	0.9
Cancer	0.6	0.3	0.9
Heart Attack	0.5	0.3	0.8
Angina	0.5	0.2	0.7
COPD	0.3	0.1	0.4
Hepatitis C	0.2	0.0	0.4

Cigarette Smoking

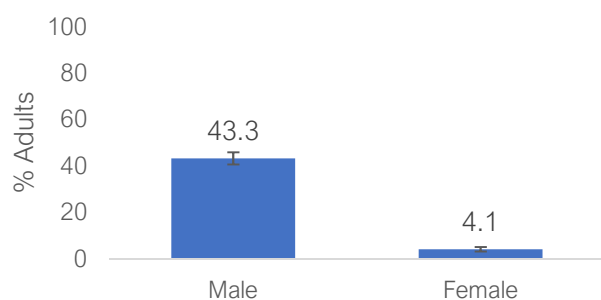
About one out of five (22.5%) adults in RMI reported cigarette smoking in the last 30 days. A majority of these adults (83.1%) smoke every day. Over half (57.4%) of these smokers reported that they want to quit. The average age adults started smoking among every day smokers in RMI was 19 years old.

Smoking Status among Adults in RMI, 2018

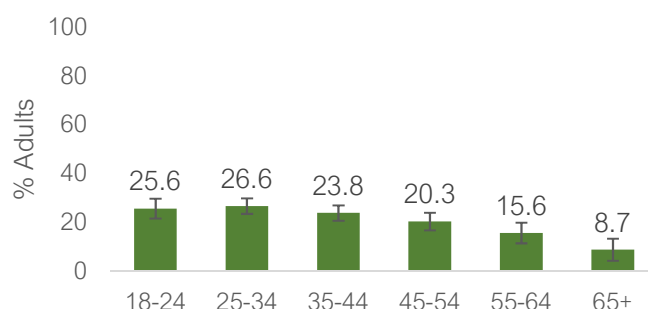


Smoking prevalence was highest among men, young adults, and adults living in the Outer Atolls.

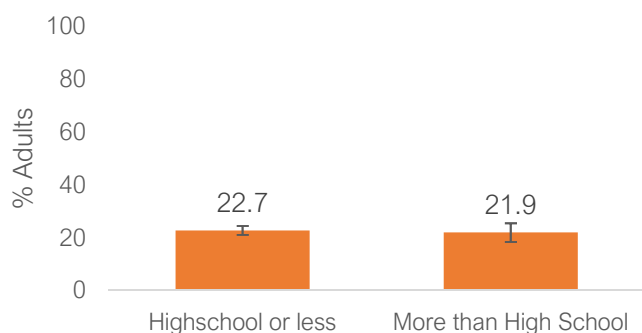
Smoking Status, by gender



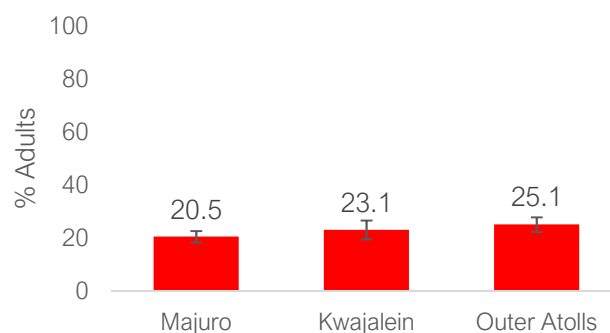
Smoking Status, by age



Smoking Status, by education



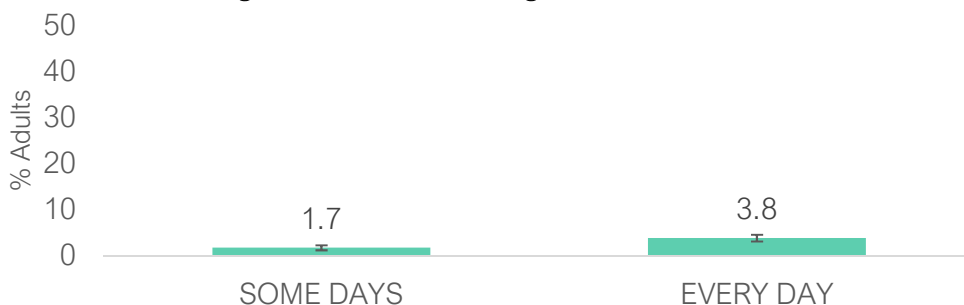
Smoking Status, by atoll



E-Cigarette Use

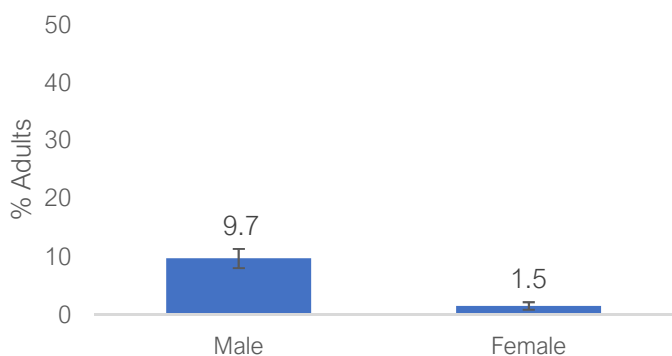
5.5% of adults in RMI reported use of e-cigarettes in the past 30 days, and 68.6% of these adults were every day users.

E-cigarette Use among Adults in RMI, 2018

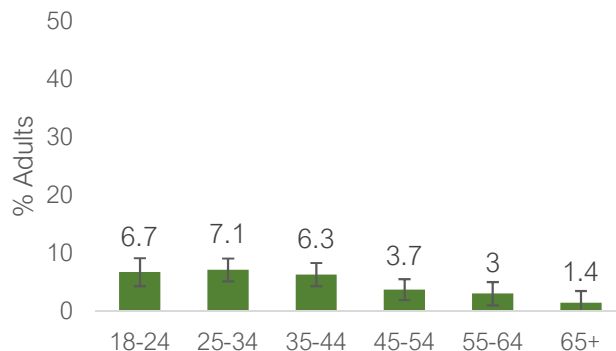


Although e-cigarette use prevalence is relatively low in RMI compared to cigarette smoking, it appears that men, young adults, more educated, and adults living in Majuro are taking up this habit.

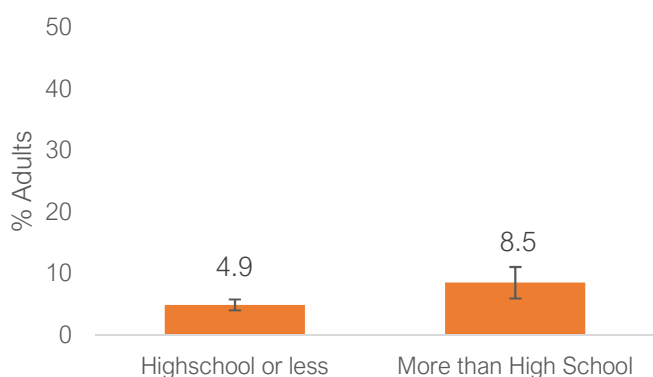
E-cigarette Use, by gender



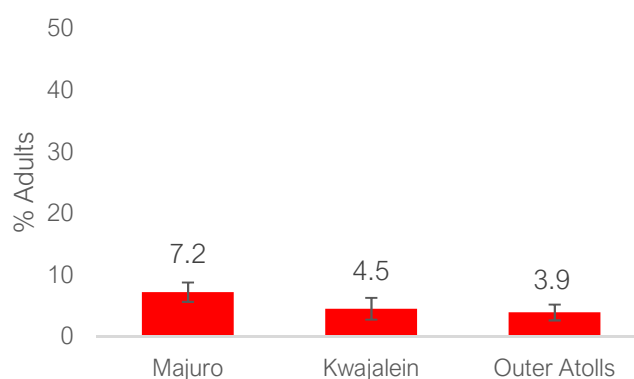
E-cigarette Use, by age



E-cigarette Use, by education



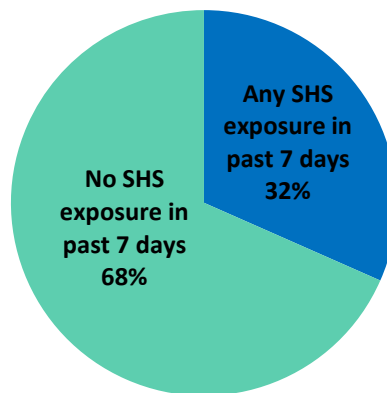
E-cigarette Use, by atoll



Second-Hand Smoke Exposure

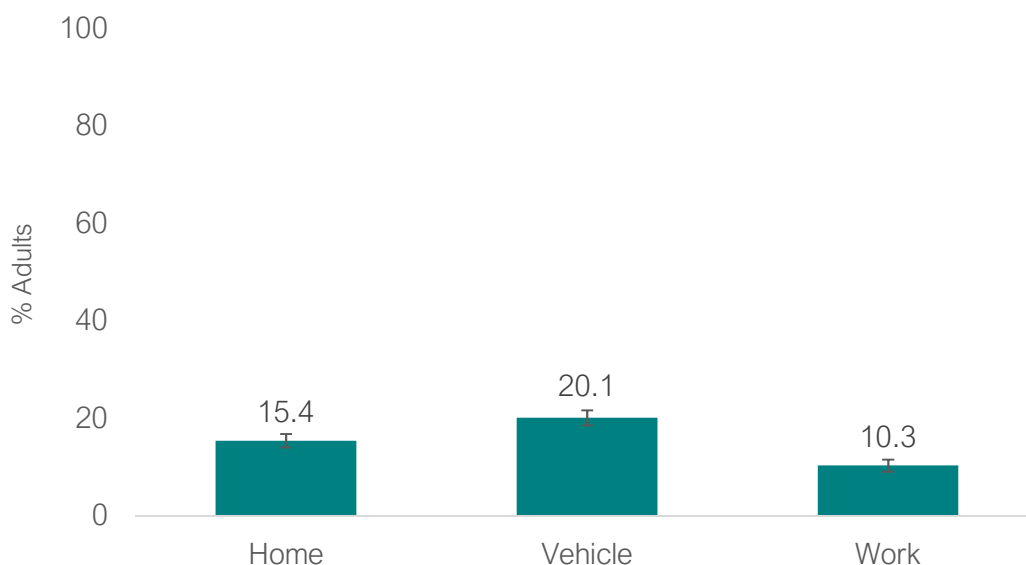
About one-third (31.6%) of all adults in RMI reported some sort of exposure to second-hand smoke (SHS) at home, in a vehicle, or at work in the past 7 days.

Adult second-hand smoke exposure in RMI, 2018



The most common place of second-hand smoke exposure was in a vehicle (20.1%). 10.3% of adults reported second-hand smoke exposure at work and 15.4% of adults reported second-hand smoke exposure at home.

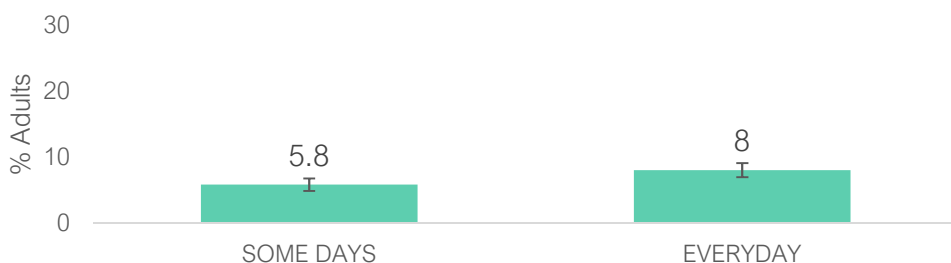
SHS Exposure among Adults in RMI, 2018



Betel Nut Use

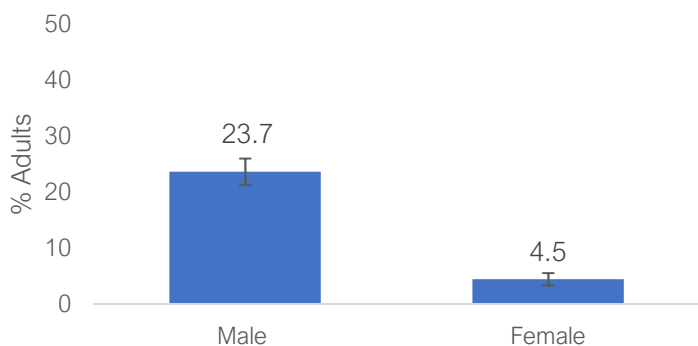
13.8% of adults in RMI reported betel nut use in the past 30 days. Over half (57.8%) of adults that chew betel nut, chew every day. A majority of respondents (96.5%) who use betel nut add tobacco. About 75% of respondents who used betel nut said they wanted to quit.

Betel Nut Chewing Status in RMI, 2018

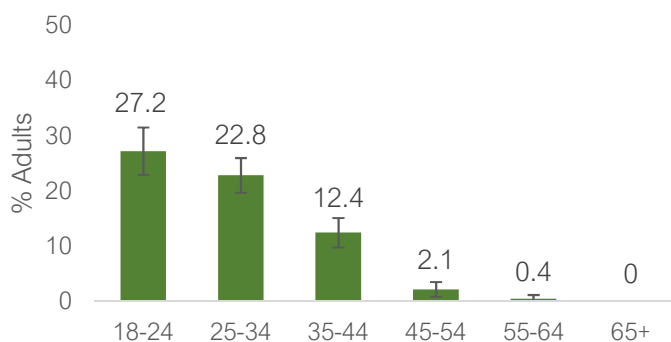


Betel nut chewing is most prevalent among men, young adults, those with a higher education, and adults living in Majuro.

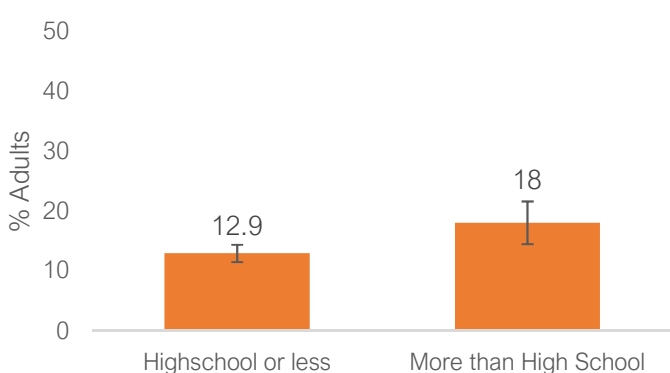
Betel Nut Chewing Status, by gender



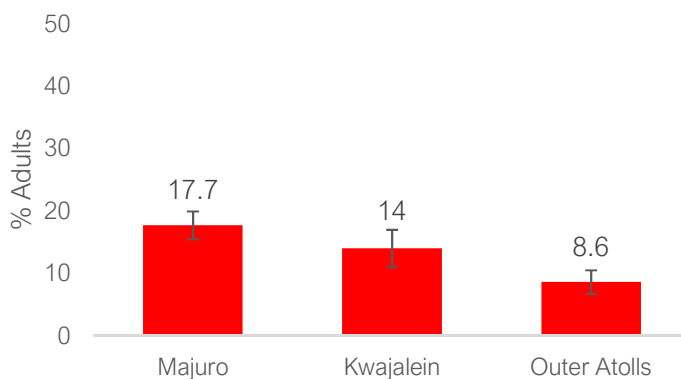
Betel Nut Chewing Status, by age



Betel Net Chewing Status, by education



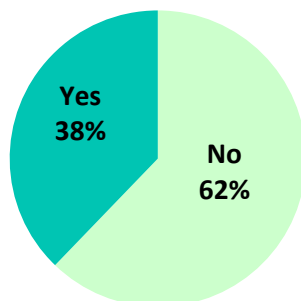
Betel Nut Chewing Status, by atoll



Overall Tobacco Use

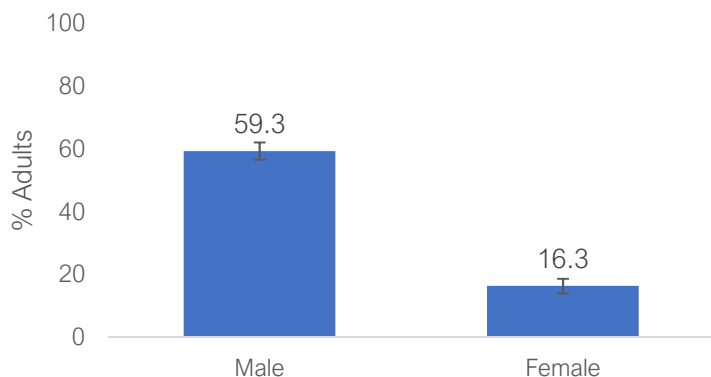
Over one-third (37.8%) of adults in RMI reported using any form of tobacco (smoke, chewing tobacco, or with chew betel nut with added tobacco).

Any Tobacco Use among Adults in RMI, 2018

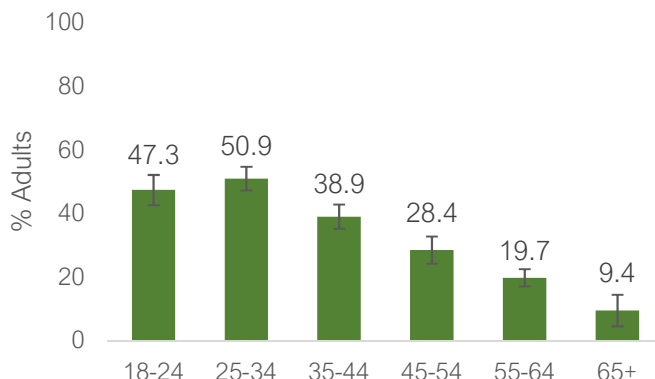


Tobacco use was more prevalent among men, young adults, more educated individuals, and those living in Kwajalein.

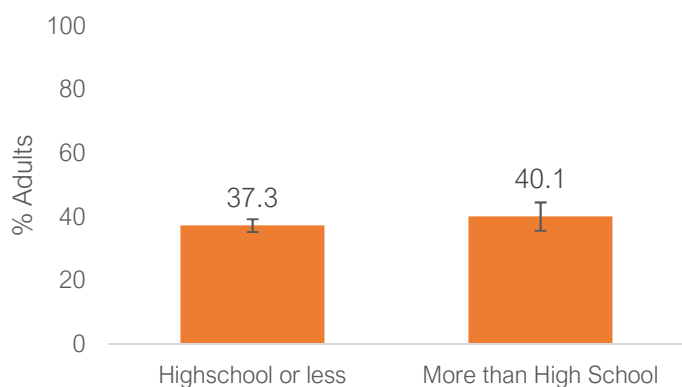
Any Tobacco Use, by gender



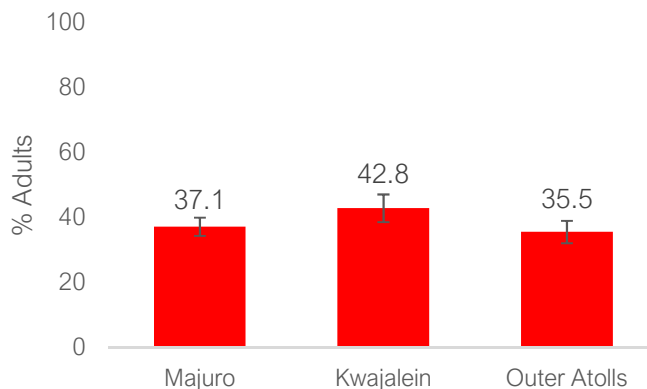
Any Tobacco Use, by age



Any Tobacco Use, by education



Any Tobacco Use, by atoll



Alcohol Use and Binge Drinking

16.3% of adults in RMI reported alcohol use in the past 30 days. Only 0.8% of adults reported drinking alcohol every day in the past 30 days. 14.8% of adults reported binge drinking* in the past 30 days. The average age that adults start drinking among those who drank in the past 30 days in RMI was 20 years old.

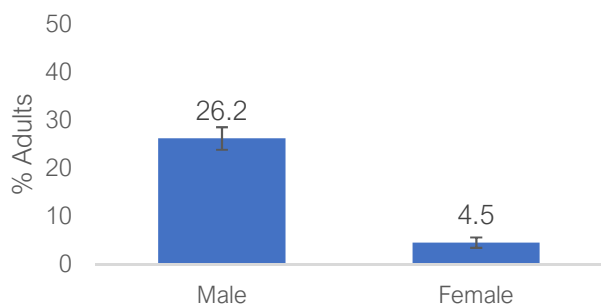
*(binge drinking is defined as drinking 4 or more standard drinks on one occasion for women and 5 or more standard drinks on one occasion for men)

Alcohol Status among Adults in RMI, 2018

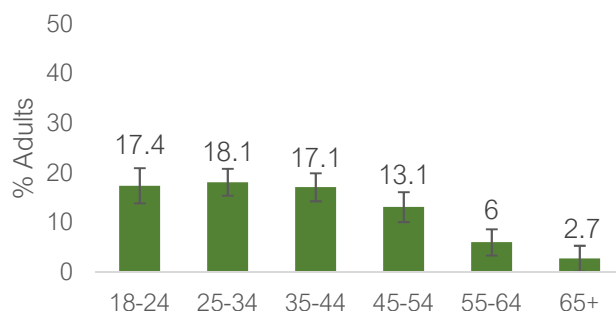


Binge drinking is more prevalent among men and more educated adults. Additionally, binge drinking is most prevalent in Kwajalein.

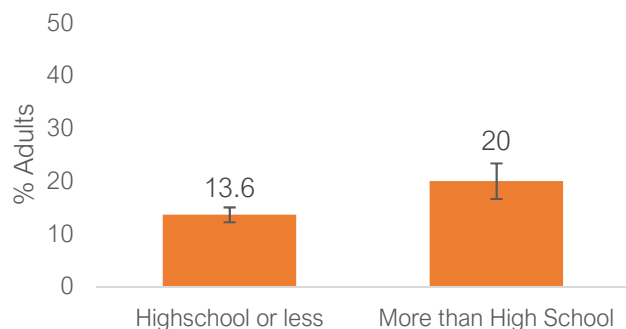
Binge Drinking, by gender



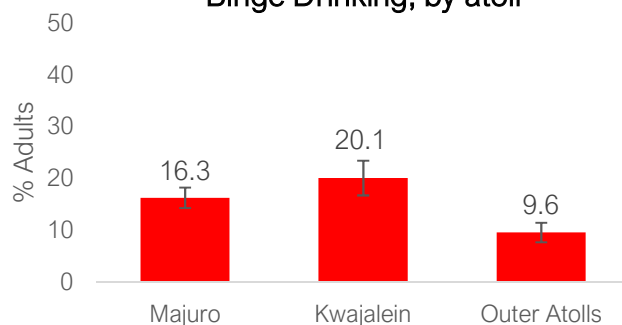
Binge Drinking, by age



Binge Drinking, by education



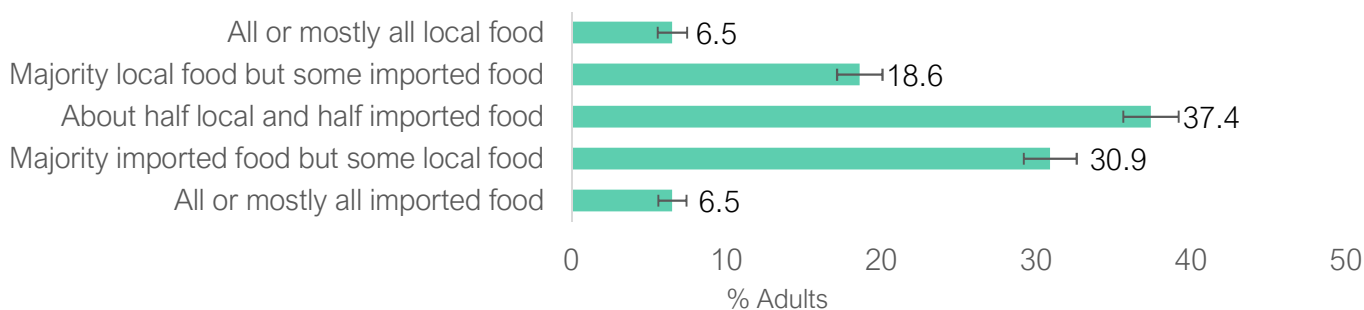
Binge Drinking, by atoll



Regular Diet

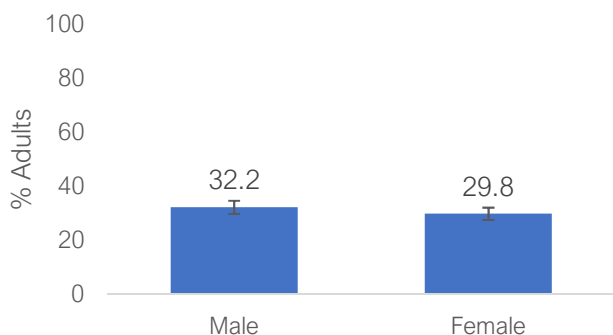
Over one-third of adults in RMI (37.4%) reported eating a majority imported food or all imported food. Another third of adults reported eating about half local food and half imported food. It was estimated that only 6.5% of adults in RMI eat all or mostly local food.

Regular Diet among Adults in RMI, 2018

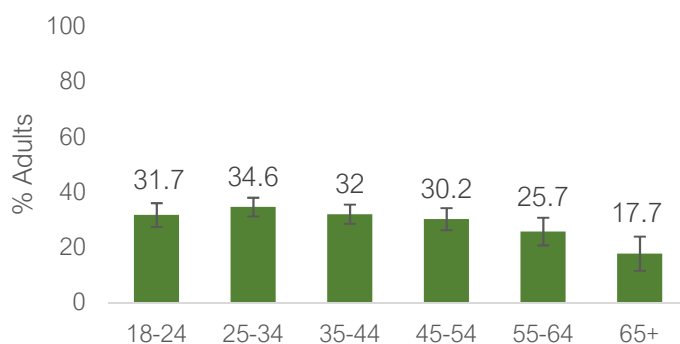


A diet consisting of a majority of imported food was more prevalent young adults, more educated adults, and those living in Kwajalein.

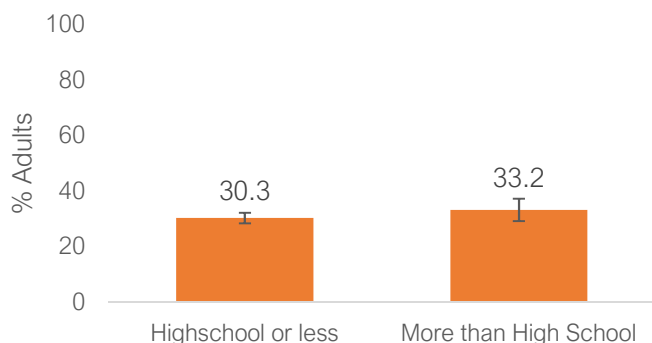
Majority Imported Food, by gender



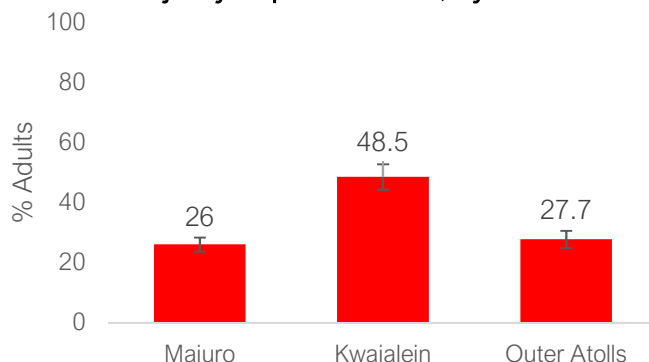
Majority Imported Food, by age



Majority Imported Food, by education



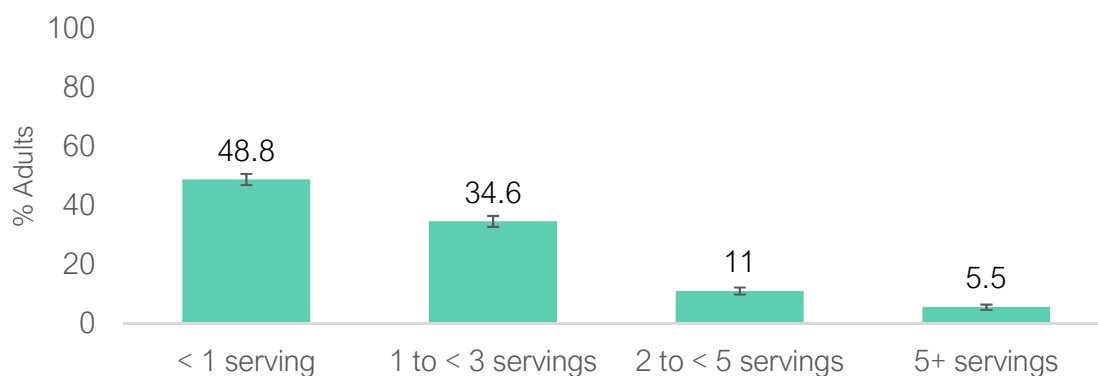
Majority Imported Food, by atoll



Fruit and Vegetable Consumption

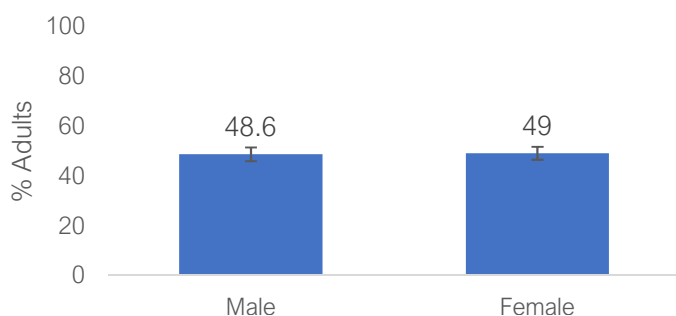
A majority of adults in RMI (94.5%) consume less than the recommended daily servings of fruits and vegetables (5 per day), and about half (48.8%) consume <1 serving of fruits and vegetables daily.

Daily F&V Consumption among Adults in RMI, 2018

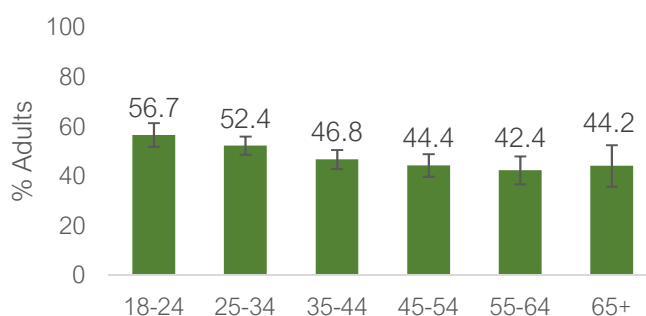


Very low fruit and vegetable consumption (<1 serving per day) was more prevalent among young adults, less educated individuals, and those living in the outer atolls.

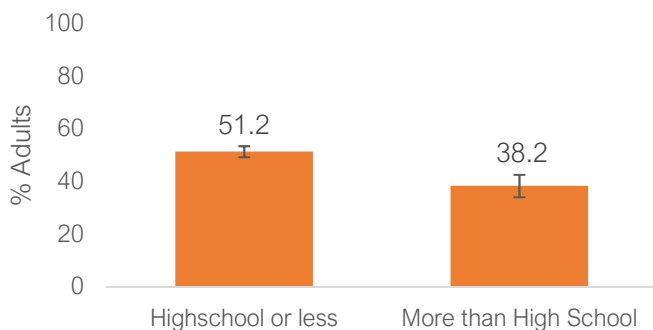
<1 F&V serving/day, by gender



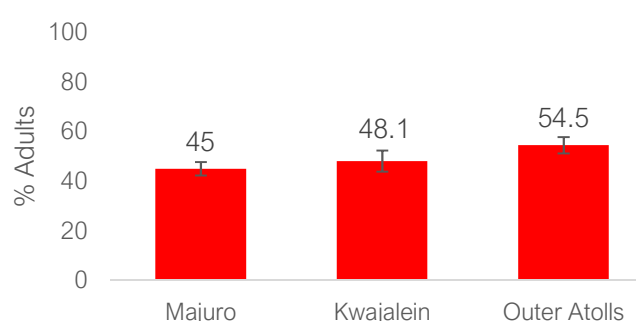
<1 F&V serving/day, by age



<1 F&V serving/day, by education



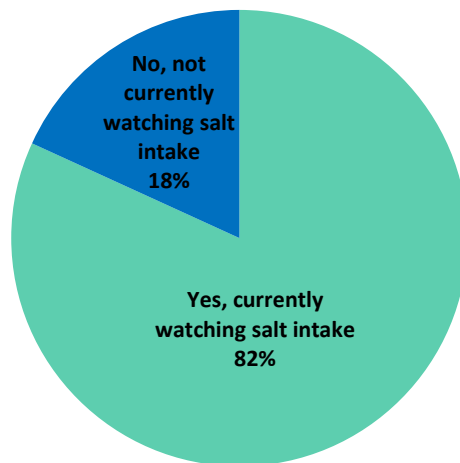
<1 F&V serving/day, by atoll



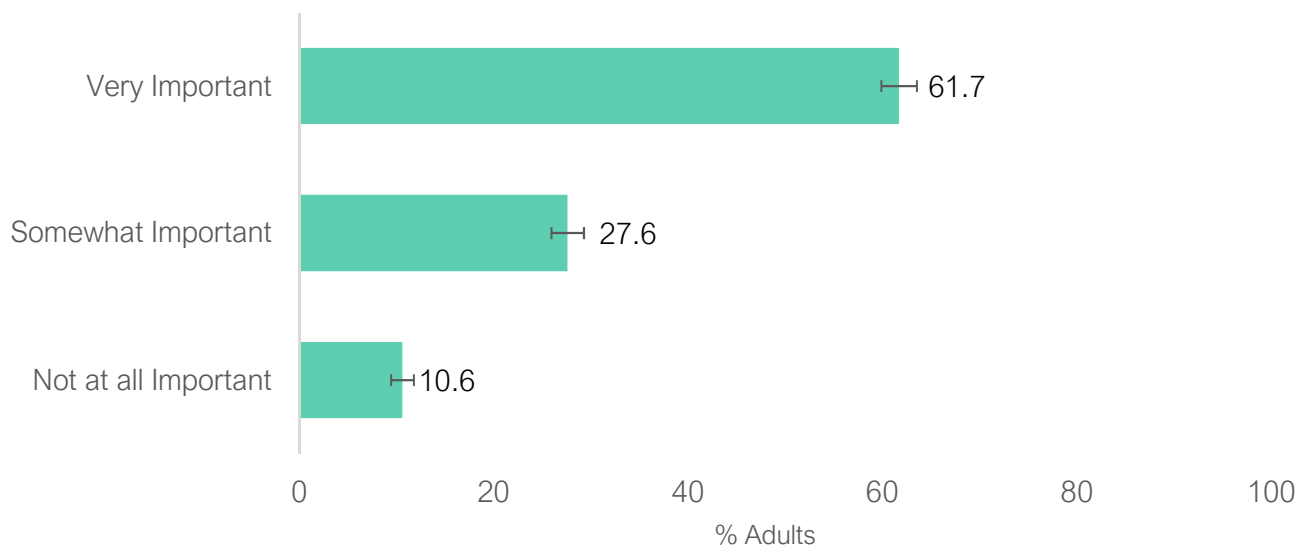
Sodium

81.8% of adults in RMI say they are currently watching their salt intake. Over half (61.7%) of adults in RMI feel that lowering their dietary salt intake is very important.

Adult sodium intake in RMI, 2018



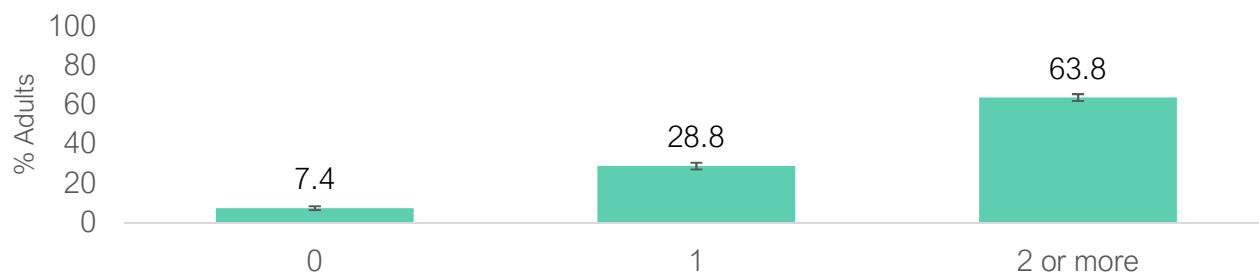
Self-reported Importance of Lowering Dietary Salt among Adults in RMI, 2018



Processed Meat Consumption

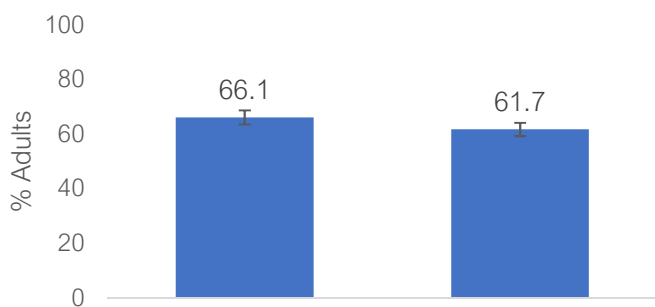
Most adults in RMI (92.6%) consume processed meat at least once per day.

Times Processed Meats are Consumed Daily among Adults in RMI, 2018

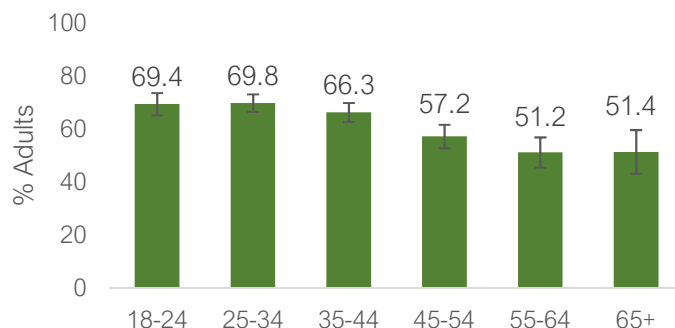


Heavy consumption of processed meats (2+ times per day) is more prevalent among men and younger adults. Majuro has the highest prevalence of heavy consumption of processed meats (71.6%), followed by Kwajalein (61.9%), and the Outer Atolls (53.8%).

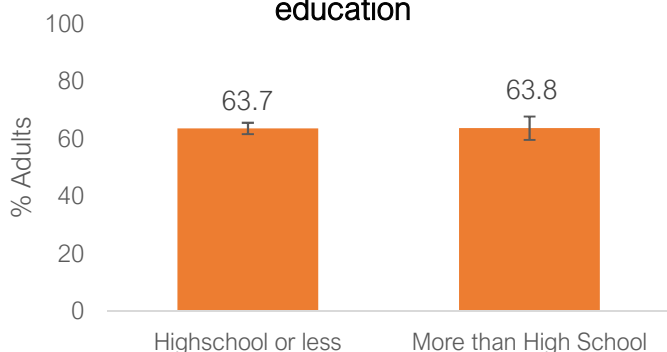
Processed Meats 2+ Times per Day, by gender



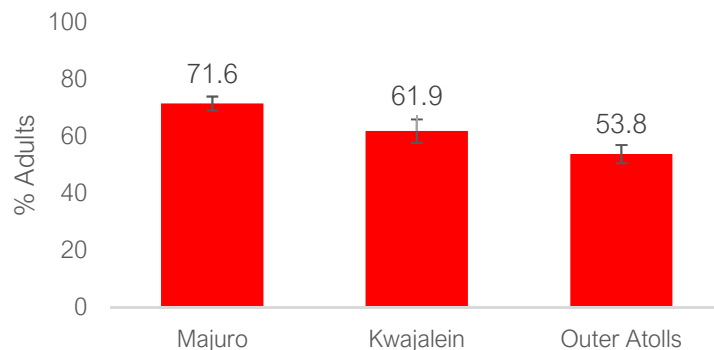
Processed Meats 2+ Times per Day, by age



Processed Meats 2+ Times per Day, by education



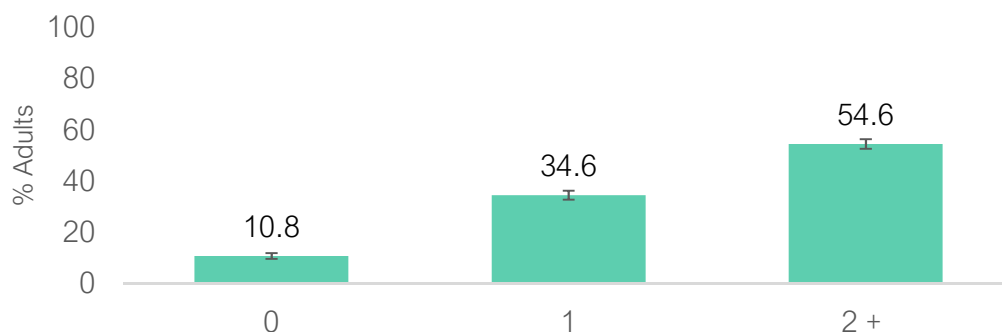
Processed Meats 2+ Times per Day, by atoll



Sugar-Sweetened Beverages

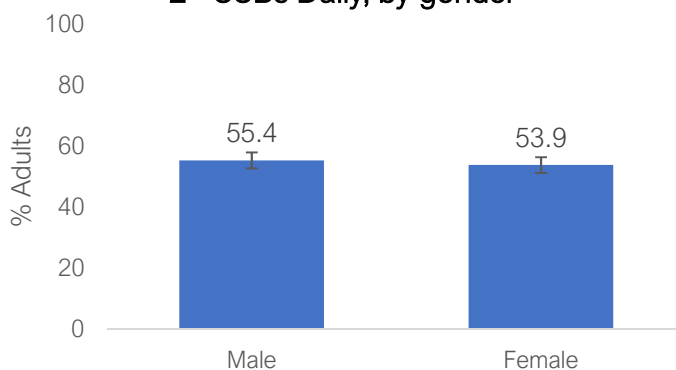
Most adults (89.2%) in RMI consume at least one sugar-sweetened beverage (SSB) each day. Over half (54.6%) consume 2 or more SSBs daily.

SSBs Consumed Daily among Adults in RMI, 2018

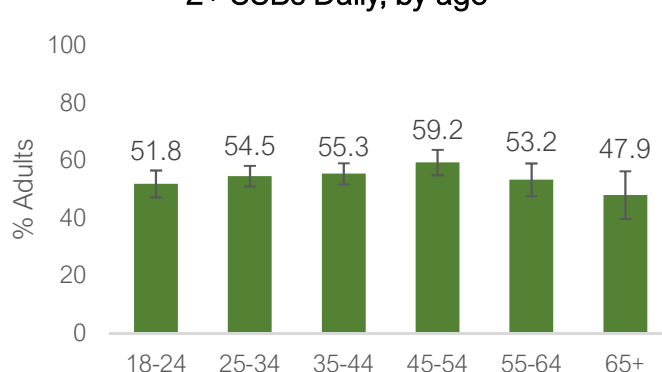


Heavy consumption of SSBs (2+ SSBs daily) is most prevalent among less educated adults, and those living in the outer atolls.

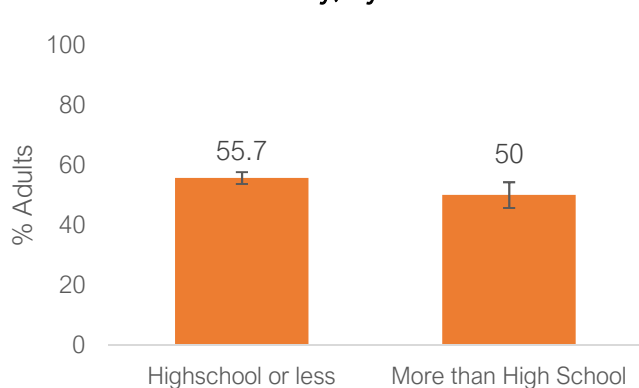
2+ SSBs Daily, by gender



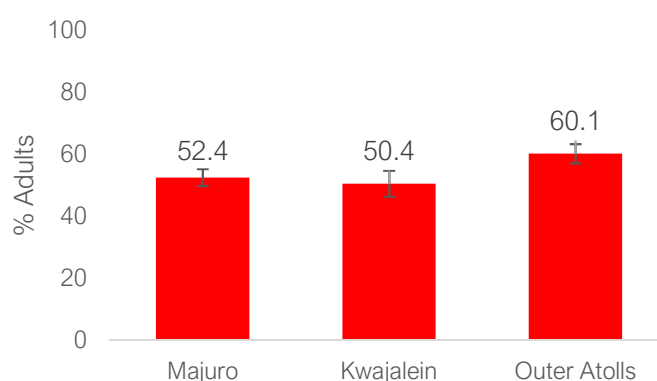
2+ SSBs Daily, by age



2+ SSBs Daily, by education



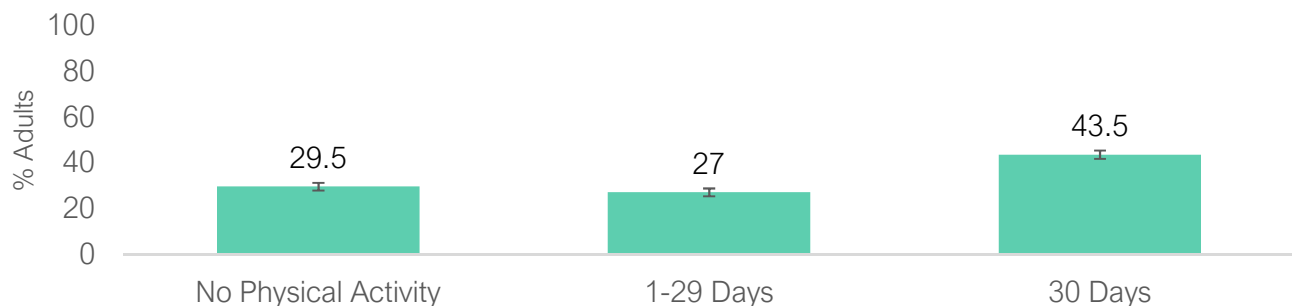
2+ SSBs Daily, by atoll



Physical Activity

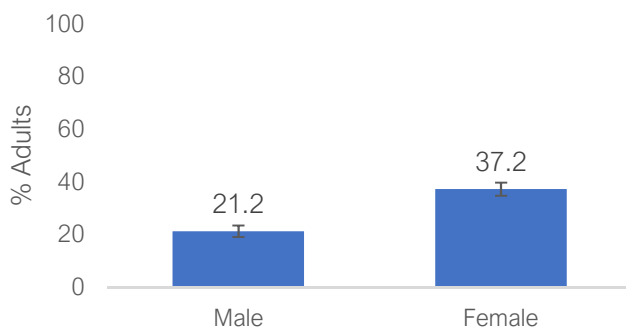
In RMI, about one-third (29.5%) of adults did not engage in any physical activity specifically for exercise in the past month. Less than half (43.5%) participated in physical activity for exercise every day in the past 30 days.

Days of Physical Activity for Exercise in Past Month among Adults in RMI, 2018

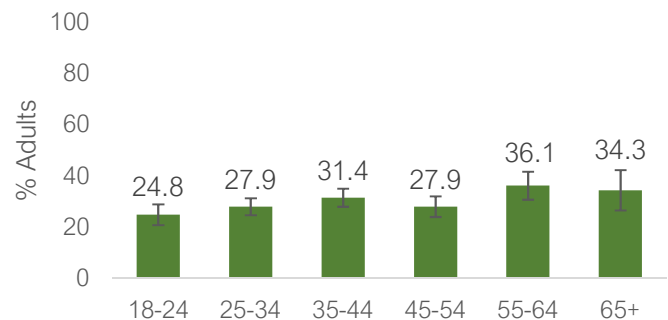


No physical activity is most prevalent among women, older adults, less educated adults, and those living in Kwajalein.

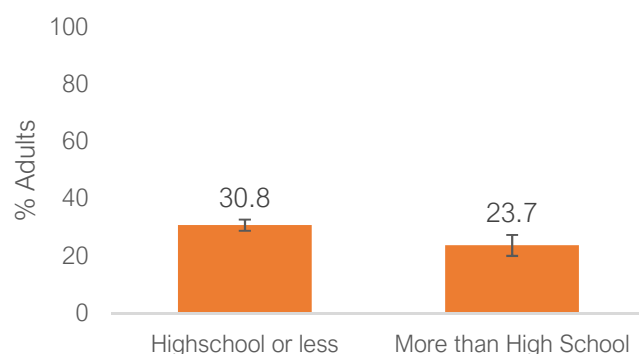
No Physical Activity, by gender



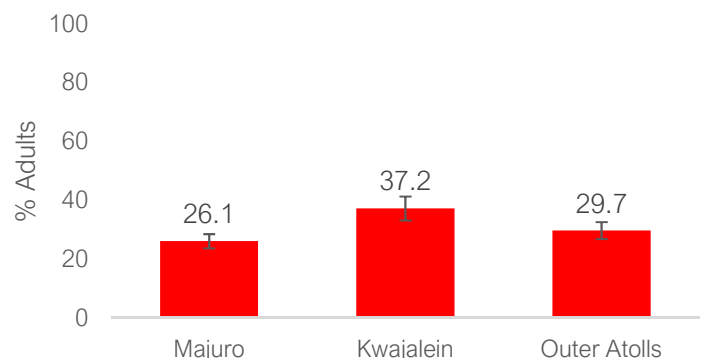
No Physical Activity, by age



No Physical Activity, by education



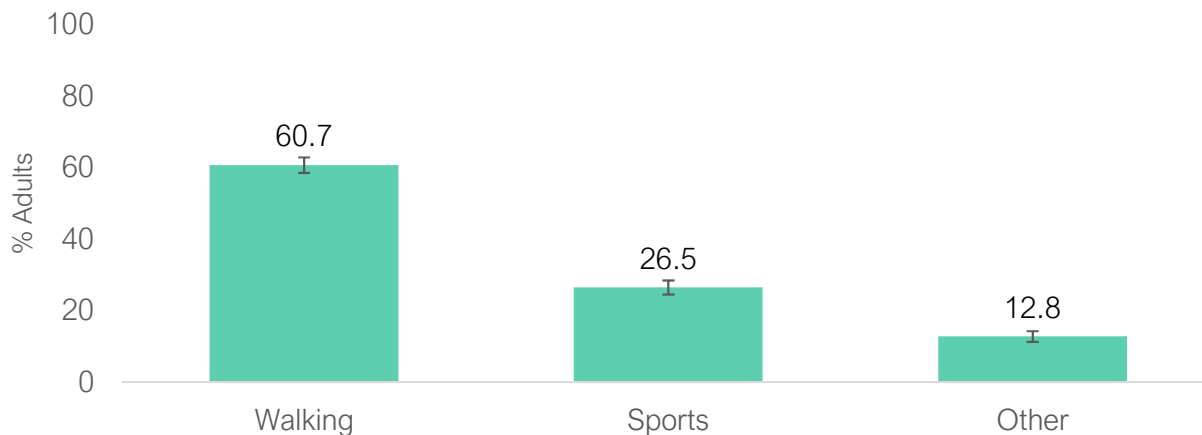
No Physical Activity, by atoll



Type of Physical Activity

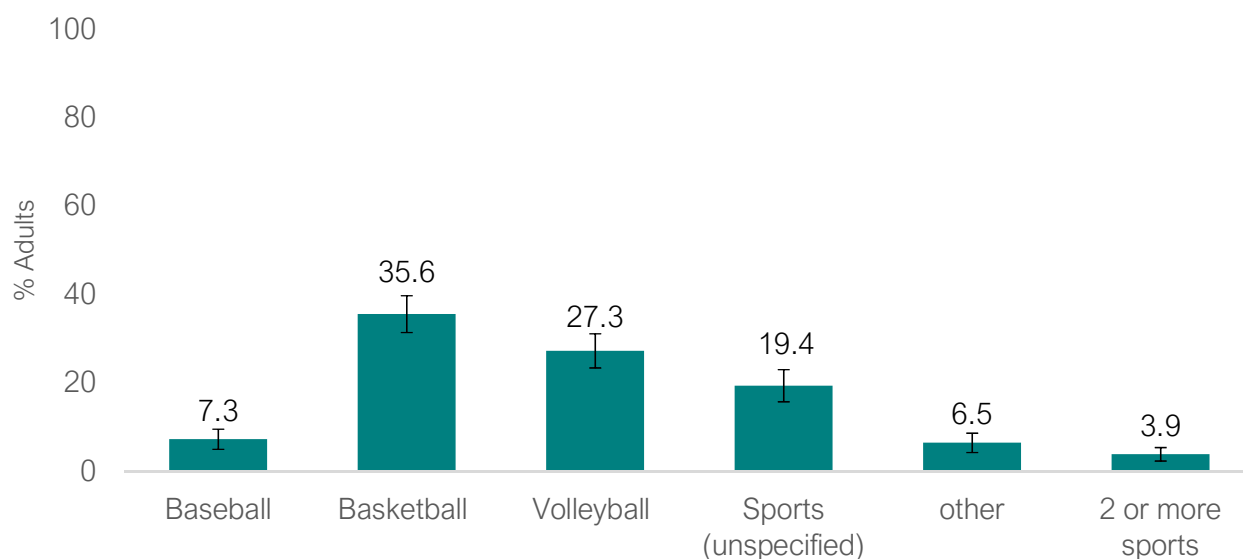
Among adults in RMI, walking was the most prevalent form of physical activity done for exercise (60.7%). In addition, 26.5% of adults in RMI play sports to stay physically active.

Types of Physical Activity, among Adults in RMI, 2018



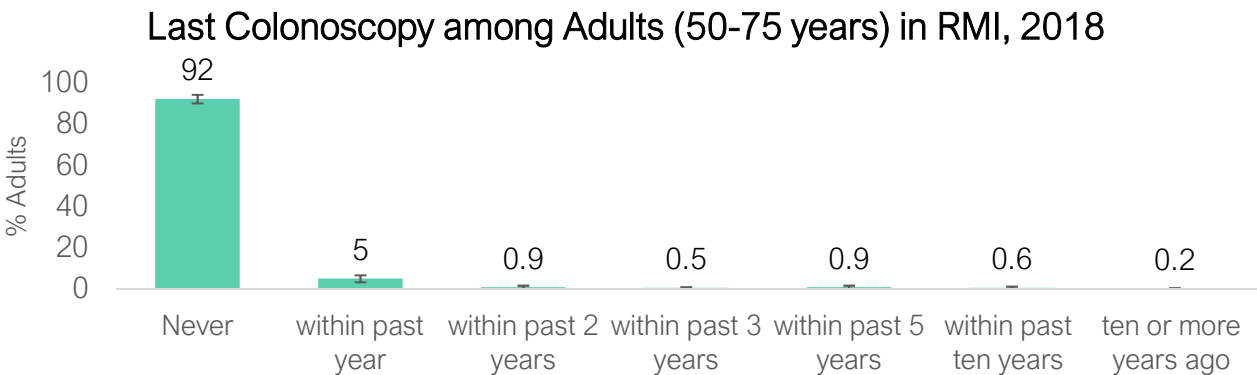
Among adults in RMI who play sports, the most common sports reported were basketball (35.6%) and volleyball (27.3%).

Types of Sports Played among Adults in RMI, 2018

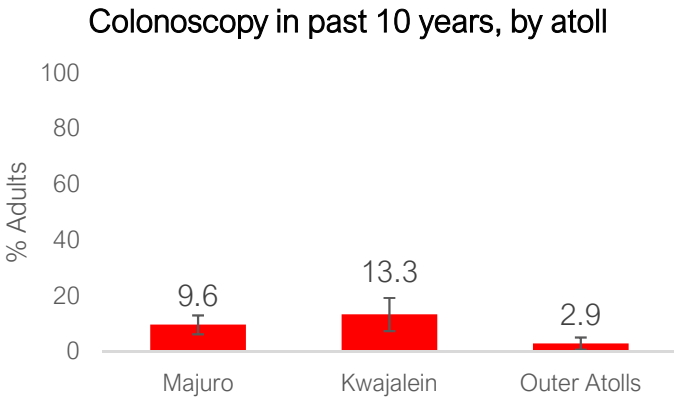
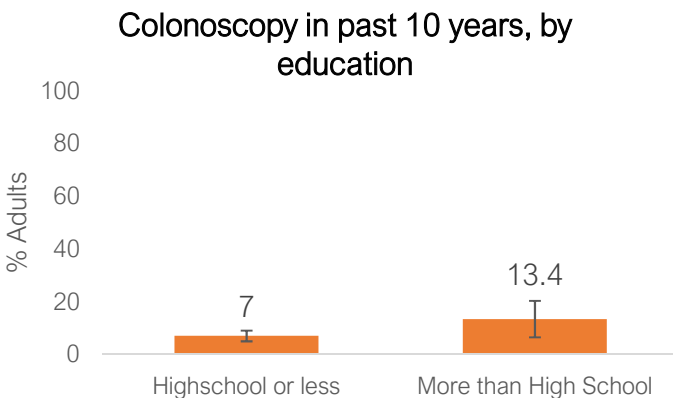
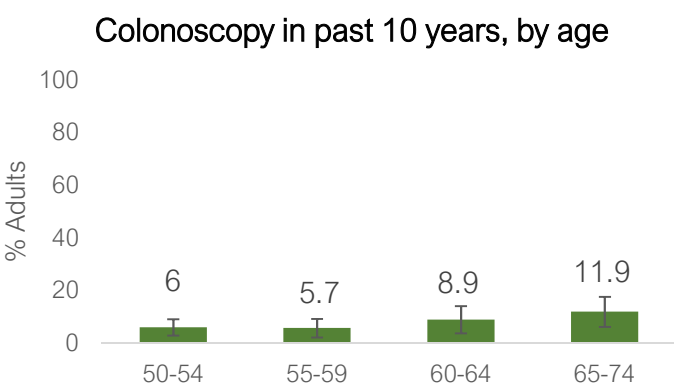
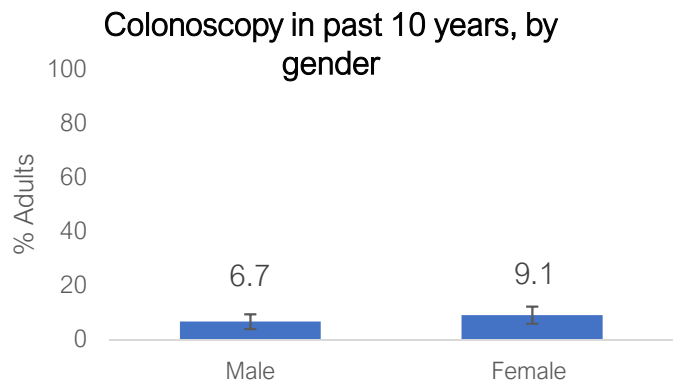


Colon Cancer Screening: Colonoscopy

Most adults 50 to 75 years old in RMI (92%) have never received a colonoscopy. Only 7.9% of adults 50 to 75 years meet the American Cancer Society recommendation of receiving a colonoscopy every 10 years.



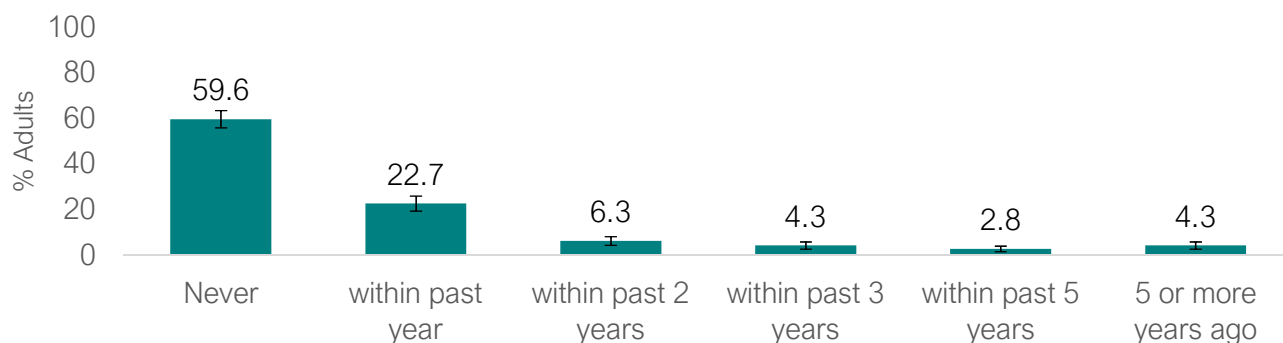
The recommendation for receiving a colonoscopy is met more by women, older adults, more educated adults and those living in Kwajalein.



Colon Cancer Screening: Blood Stool Test

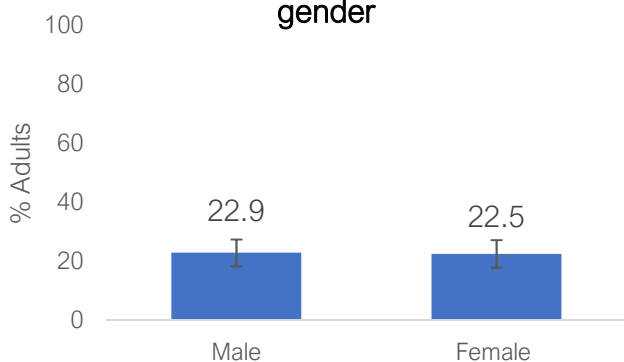
Over half (59.6%) of adults in RMI have never received a Blood Stool Test. About 1 in 5 adults (22.7%) 50-75 years old in RMI meet the American Cancer Society recommendation of receiving a Blood Stool Test once per year.

Last Blood Stool Test among Adults (50-75 years) in RMI, 2018

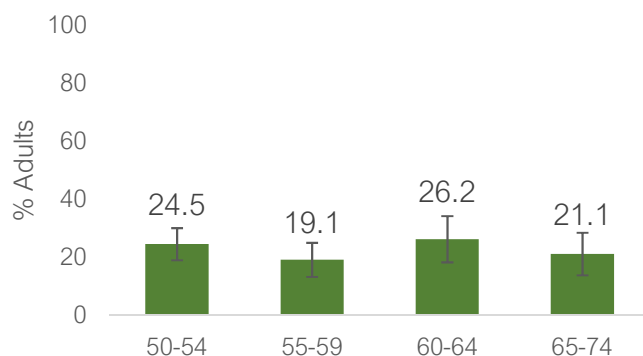


Kwajalein had the highest prevalence (34.6%) of adults meeting the recommendation of receiving a blood stool test every year.

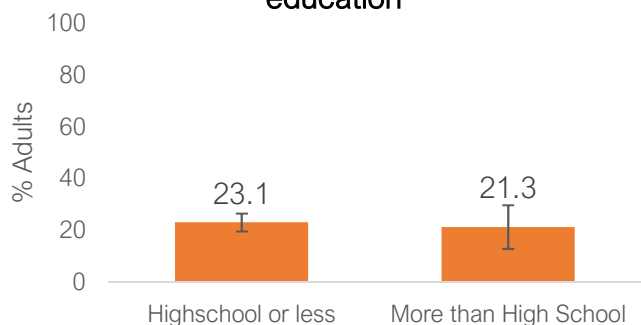
Blood Stool Test in past year, by gender



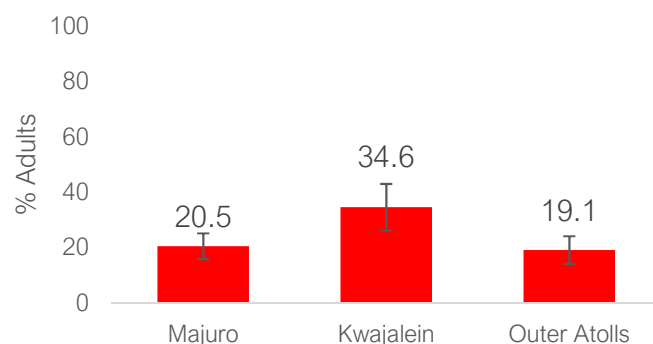
Blood Stool Test in past year, by age



Blood Stool Test in past year, by education

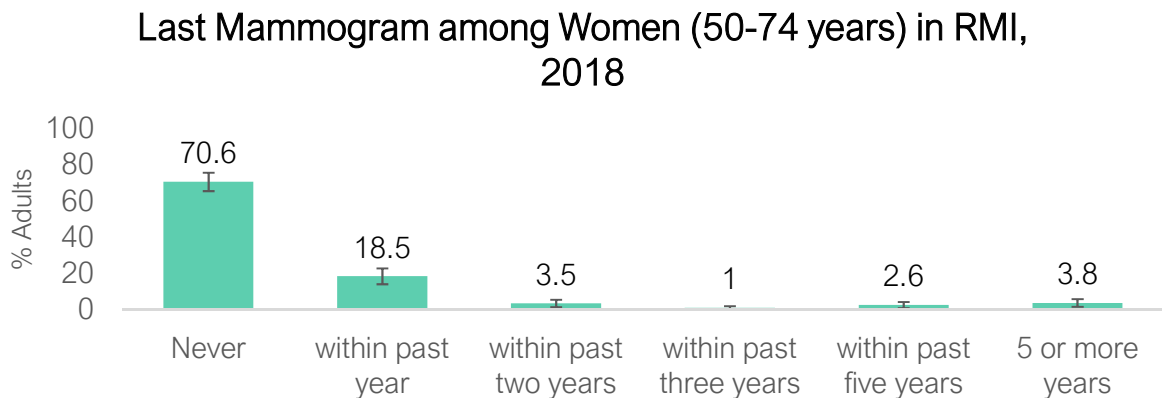


Blood Stool Test in past year, by atoll

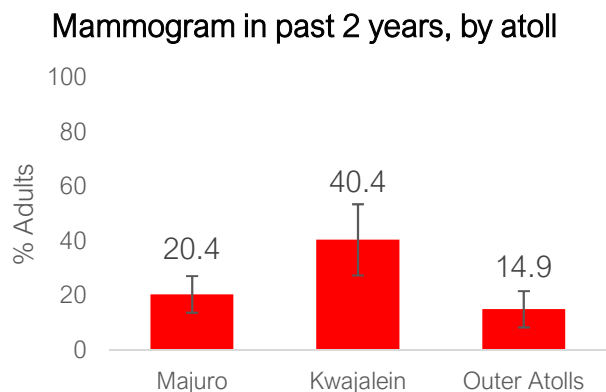
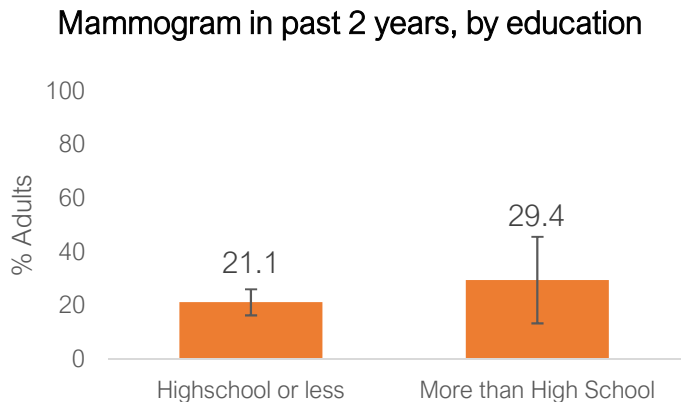
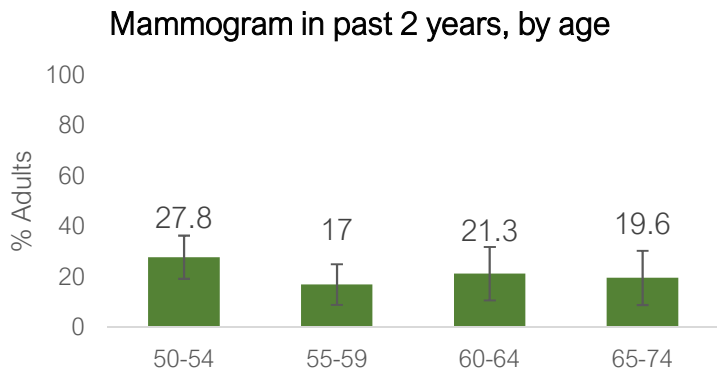


Female Cancer Screening: Mammogram

About 1 in 5 women (22%) aged 50-74 years in RMI have received a mammogram in the past two years (per USPTF recommendation); 70.6% have never received a mammogram.



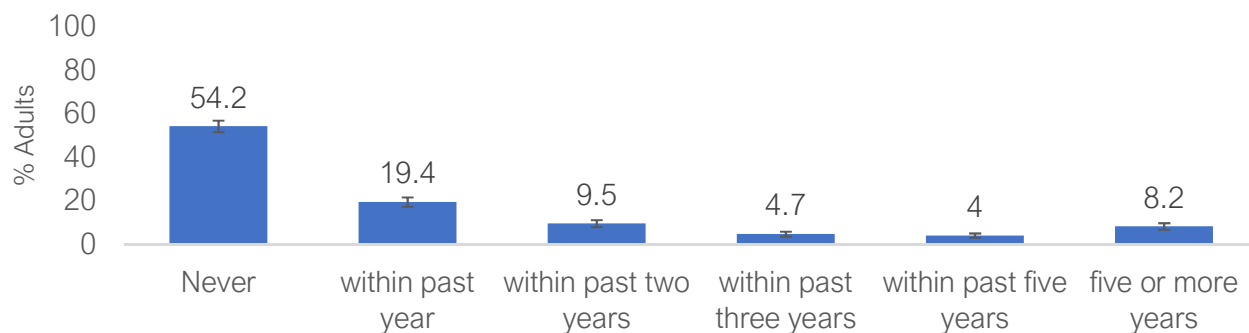
The recommendation for receiving a mammogram is met more by more educated women, women 50-54 years old, and those living in Kwajalein.



Female Cancer Screening: Pap/VIA

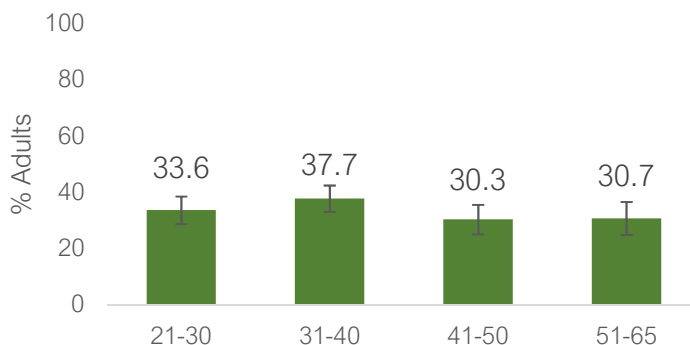
About 1 in 3 women (33.6%) aged 21-65 years in RMI have had a Pap Smear or Vaginal Inspection with Acetic Acid (VIA) in the past 3 years (per USPTF recommendation); Over half (54.2%) have never had a Pap Smear or VIA.

Last Pap or VIA among Women (21-65 years) in RMI, 2018

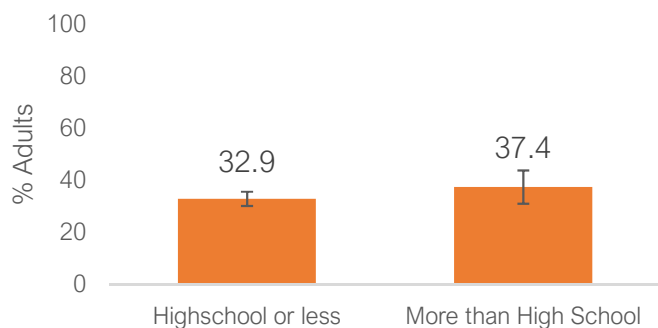


The recommendation for receiving a Pap or VIA is met more often by more educated women and women living in Kwajalein.

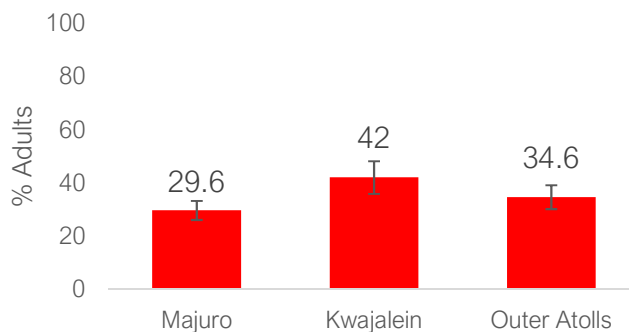
Pap Smear in past 3 years, by age



Pap Smear in past 3 years, by education

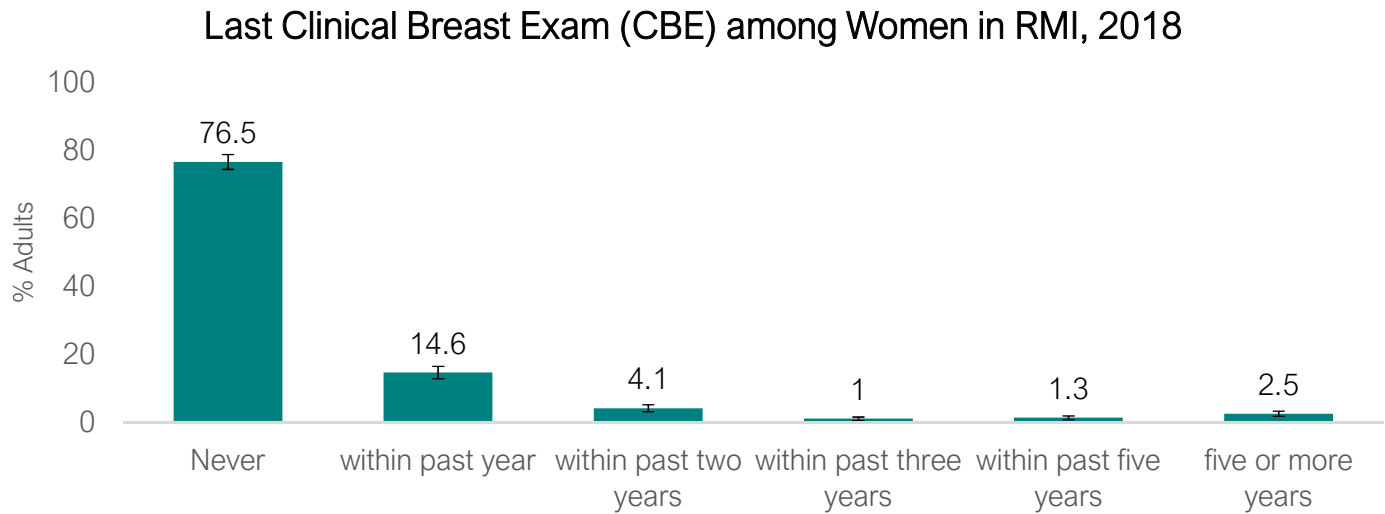


Pap Smear in past 3 years, by atoll



Female Cancer Screening: Clinical Breast Exam

About three out of four women (76.5%) have never had a clinical breast exam. There are currently no set recommendations for receiving a clinical breast exam.



Important notes about survey

Limitations:

- A good portion of the data collected are self-reported, thus bias may exist.
- Not all of the outer atolls could be surveyed, therefore these data do not represent all of the RMI. However, the majority of the adult population was included in the sample, and some of the outer atolls were sampled.

Strengths:

- Physical and biochemical measurements were conducted for NCD prevalence estimation rather than just self-report.
- Sample size was exceptionally large and included approximately 10% of all adults residing in RMI
- Quality and thorough training provided for all surveyors and partners (including standardization of anthropometric measures - height and weight)
- Use of tablets ensured data collection was clean, efficient, and timely.
- There were successful partnerships and collaboration between internal and external stakeholders
- The majority of the randomly selected participants were agreeable to taking part in the survey, resulting in a high response rate of 92.3%
- To ensure quality and authentic collection of data, surveyors were required to take photos of selected participant, participant's homes, and attain signatures from participants each time a section of the survey was completed (participants were informed photos would not be used publicly but only seen by survey managers for auditing purposes only).

Challenges:

- The original methodology requested that after the interview, participants that fast that evening and show up at designated locations nearby the following day for fasting measurements. Unfortunately, participant turn-out was low using this methodology. Therefore, a slight adjustment to survey methodology was initiated three months into collection, in which surveyors came back to the participant's home for fasted measurements.
- Securing funds and lengthy processes for procurement caused survey delays.
- There were about 44 trained surveyors. Within three months, more than half of the surveyors were lost to various factors like full time jobs, school, and travel. A handful of surveyors who were not following proper protocol of data collection also had their contracts terminated. In the end, there were only about 10 reliable surveyors.
- For Majuro and Ebeye (urban centers), it was a challenge to find selected participants who had full time job or who were attending school. Surveyors found it difficult to find them at home during the day and during revisits in the evening. Multiple house visits were therefore necessary.
- Participants occasionally forget to fast for the biochemical measurement of the survey, therefore surveyors were obligated to reschedule visits.

Recommendations

As previously mentioned, non-communicable diseases are the leading causes of morbidity and mortality in the U.S. Affiliated Pacific Islands, which includes the RMI [1]. Based on the results found, it is apparent that many RMI residents are currently suffering from various NCDs and their lifestyle may be contributing to these morbidities. Overweight/obesity, tobacco use, and poor diet have been identified as prevalent risk factors for developing NCDs in the RMI. Evidence-based programs and policies targeting adults as well as youth may be particularly effective in reducing the prevalence of NCDs in the RMI.

High prevalence of NCDs, specifically diabetes is apparent. Additionally, there appear to be many individuals with undiagnosed NCDs in the population. Among those diagnosed with diabetes or hypertension, control of these conditions appears to be poor. Programs that encourage individuals to seek professional care for screening and treatment of NCDs are recommended. Additionally, evidence-based self-management programs could be considered.

Prevalence of NCDs may also be impacted by limited medical resources in this small island nation such as lack of medical specialists, lack of appropriate equipment and technicians, and lack of laboratory testing supplies and capacity. This is especially true in the smaller outer islands. These limited resources may be contributing to the low prevalence of medical screenings, including mammograms, pap smear/VIA, and colonoscopies.

Priority areas for health improvement in the RMI include:

1. Reducing overweight and obesity by improving diet/nutrition education and access and increasing physical activity using evidence-based programs.
2. Strengthening NCD clinical screening and management programs among adults in RMI.
3. Providing appropriate cessation services for substance use, specifically tobacco and alcohol.
4. Consider policy approaches to reduce certain risk factors, especially those in the Monitoring Alliance for NCD Action (MANA) framework.
5. Support chronic disease self-management programs to help individuals with NCDs control their disease.

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 - Majuro Atoll Local Government
 - Jaluit Atoll Local Government
 - Wotje Atoll Local Government
 - Arno Atoll Local Government
 - KBE Local Government
- **School and Churches for survey sites**
 - Rita Christian Academy
 - Rita Protestant Church
 - Rita Elementary School
 - Tiete Protestant Church
 - Youth to Youth in Health
 - Majuro Assumption School
 - Canvasback Wellness Center
 - DUD Head Start Program
 - Church of the Latter-Day Saints
 - University of the South Pacific, Majuro Campus
 - Rairok Full Gospel Church
 - Rairok Baptist Church
- **Taiwan Health Center**
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APPENDIX: Details on indicators

Variable	Source question	Classifications used in this report
General Health	Would you say that your general health is...	The following responses were used: <ul style="list-style-type: none"> • Excellent • Very good • Good • Fair or okay • Poor or not good
Last doctor visit	About how long has it been since you last visited a medical provider for an annual checkup? An annual checkup is a general physical exam, not an exam for a specific injury, illness, or condition.	The following responses were used: <ul style="list-style-type: none"> • Within past year • Within past 2 years • Within last 5 years • 5 or more years ago • Never
Last dental visit	How long has it been since you last visited a dentist or a dental clinic for any reason? Include visits to dental specialists, such as orthodontists.	The following responses were used: <ul style="list-style-type: none"> • Within past year • Within past 2 years • Within last 5 years • 5 or more years ago • Never
Teeth missing	How many of your permanent teeth have been removed because of tooth decay or gum disease? Include teeth lost to infection, but do not include teeth lost for other reasons, such as injury or orthodontics.	<ul style="list-style-type: none"> • 1 to 5 • 6 or more but not all • All • None
Body Mass Index Category	Measured height and weight were used.	BMI is calculated by taking your weight (in kilograms) over your height squared (in centimeters). We used CDC categories: <ul style="list-style-type: none"> • Underweight <18.5 • Normal 18.5-24.9 • Overweight 25-29.9 • Obese 30+
Hypertension	Measured blood pressure and self-reported high blood pressure and medication status was used to categorize hypertension.	Individuals were categorized as having hypertension if their measured BP was $\geq 140/90$ and/or if they self-reported being diagnosed with hypertension and were taking medication for their hypertension
High blood sugar or diabetes	Measured fasting blood glucose and self-reported diagnosis of diabetes and medication status was used to categorize high blood sugar/diabetes.	Individuals were categorized as having diabetes if their fasting blood glucose was $\geq 126\text{mg/dL}$ and/or if they self-reported being diagnosed

		with diabetes and were on medication for their diabetes.
DM Doctors' Appointments per year	How many times in the past 12 months have you seen a doctor, nurse, or other health professional for your diabetes?	The following responses were used: <ul style="list-style-type: none"> • None • 1 time • 2-3 times • 4-5 times • 6 or more times
Blood Sugar Self-Check	How often do you check your blood for glucose or sugar? Include times when checked by family member or friend, but do NOT include times when checked by a health professional.	The following responses were used: <ul style="list-style-type: none"> • Never • At least one time per day • At least one time per week • At least one time per month • At least one time per year
Blood Sugar Check by Professional	A test for "A one C" (HbA1c) measures the average level of blood sugar over the past three months. How many times in the past 12 months has a doctor or nurse, or other health professional checked you for "A one C"?	The following responses were used: <ul style="list-style-type: none"> • None • 1 time • 2-3 times • 4-5 times • 6 or more times
Elevated Total Cholesterol	Measure total cholesterol was used.	If total cholesterol was ≥ 190 mg/dL the individual was classified as having elevated total cholesterol. If total cholesterol was ≥ 240 mg/dL the individual was classified as having high total cholesterol.
Ulcer	Have you ever been told by a doctor that you have ____?	Yes or no
Gout		
Arthritis		
Chronic Kidney Disease		
Asthma		
Other Heart Condition		
Heart Disease		
Hepatitis B		
Tuberculosis		
Stroke		
Cancer		
Cigarette Smoking	During the past 30 days, on how many days did you smoke tobacco products, such as cigarettes, cigars or pipes?	0 days = Non-smoker 1-29 days = some days 30 days = everyday
Age first started smoking regularly	How old were you when you first started regularly smoking tobacco?	Age ____
Quit Smoking	Do you want to quit smoking tobacco?	Yes or no
E-cigarette use	During the past 30 days, how many days did you use E-Cigarettes or a personal vaporizer (PV), or electronic nicotine?	0 days = Non-smoker 1-29 days = some days 30 days = everyday
Home 2 nd hand smoke exposure	During the past 30 days, on how many days did someone other than you smoke tobacco inside your home while you were at home?	0 days = no exposure 1-30 days = some exposure

Work 2 nd hand smoke exposure	During the past 30 days, on how many days did someone smoke in closed areas in your workplace (in the building, in a work area or a specific office?)	0 days = no exposure 1-30 days = some exposure
Vehicle 2 nd hand smoke exposure	During the past 30 days, on how many days did you ride in a vehicle where someone other than you was smoking tobacco?	0 days = no exposure 1-30 days = some exposure
Any 2 nd hand smoke exposure	Answered yes to any of the 2 nd hand smoke questions	Yes or no
Betel nut use	During the past 30 days, on how many days did you chew betel nut?	0 days= non-betel nut chewer 1-29 days= some use 30 days= Everyday use
Use tobacco in betel nut use	What kind of tobacco do you most often add to your betel nut chew?	If they answered yes to any of the following they were categorized as using tobacco with betel nut: <ul style="list-style-type: none"> • Cigarette Sticks • Imported loose tobacco • Locally grown tobacco • Other type of tobacco
Quit betel nut use	Do you want to quit chewing betel nut with tobacco?	Yes or no
Any tobacco use	Did individual use any form of tobacco (smoke, chew, or betel nut use)?	Yes or no
Alcohol consumption	During the past 30 days, on how many days did you have at least one standard drink of any alcohol?	0 days = non-drinker 1-29 days = some days 30 days = every day
Age first starting drinking alcohol	How old were you when you first started drinking alcohol?	Age _____
Binge alcohol frequency	During the past 30 days, how many days did you have: <ul style="list-style-type: none"> • for men: <ul style="list-style-type: none"> ○ Five or more standard alcoholic drinks? • for women: <ul style="list-style-type: none"> ○ Four or more standard alcoholic drinks? 	0 days = no binge 1-30 days = binge
Regular Diet	How much of your regular diet is made up of local/traditional foods (such as local fish, taro, breadfruit, banana, pandanus, etc.)?	The following responses were used: <ul style="list-style-type: none"> • Majority local food but some imported food • About half local and half imported food • Majority imported food but some local food • All or mostly all imported food
Fruit and vegetable consumption	Some of usual daily fruit consumption and daily vegetable consumption	<1 servings 1-<3 servings 3-<5 servings 5 or more servings

Watching salt intake	Most of the sodium or salt we eat comes from processed foods and foods prepared in restaurants. Salt also can be added in cooking or at the table. Are you currently watching or reducing your sodium or salt intake?	Yes or no
Importance of lowering salt in diet	How important is lowering salt in your diet?	Very important Somewhat important Not at all important
Processed meat consumption	In a typical day, how many times do you eat processed meats? This does not include canned fish.	0 servings 1 serving 2 or more servings
Sugar-sweetened beverage consumption	In a typical day, how many sugary drinks do you drink? This does not include diet drinks made with artificial sweeteners.	0 servings 1 serving 2 or more servings
Physical Activity	During the past 30 days, other than your regular job, on how many days did you participate in any physical activities or exercises such as running, sports, walking, or going to the gym, specifically for exercise?	0 = no physical activity 1-29 days = some days 30 days = every day
Type of Physical Activity	What type of physical activity or exercise did you spend the most time doing during the past 30 days?	The following categories were used: <ul style="list-style-type: none"> • Walking • Sports • Other
Hours spent per day sitting	How much time do you usually spend sitting or reclining on a regular day? (This does not include time spent sleeping)	The following categories were used: <ul style="list-style-type: none"> • <3 hours per day • ≥3 hours per day
Colonoscopy Screening	How long has it been since your last colonoscopy?	The following responses were used for adults 50-75: <ul style="list-style-type: none"> • Never • Within the past year • Within the past 2 years • Within the past 3 years • Within the past 5 years • Within the past 10 years • 10 or more years ago
Blood Stool Test	How long has it been since you had your last blood stool test?	The following responses were used for adults 50-75: <ul style="list-style-type: none"> • Never • Within the past year • Within the past 2 years • Within the past 3 years • Within the past 5 years • 5 or more years ago
Mammogram screening	How long has it been since you had your last mammogram?	The following responses were used for those women 50-74: <ul style="list-style-type: none"> • Never • Within the past year • Within the past 2 years

		<ul style="list-style-type: none"> • Within the past 3 years • Within the past 5 years • 5 or more years
Clinical breast exam	How long has it been since your last clinical breast exam?	<p>The following responses were used for all women:</p> <ul style="list-style-type: none"> • Never • Within the past year • Within the past 2 years • Within the past 3 years • Within the past 5 years • 5 or more years
Pap smear screening	How long has it been since you had your last Pap or VIA test?	<p>The following responses were used for women 21-65:</p> <ul style="list-style-type: none"> • Never • Within the past year • Within the past 2 years • Within the past 3 years • Within the past 5 years • 5 or more years